PAPER TRADE JOURNAL

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THE INTERNATIONAL WEEKLY OF THE PAPER AND PULP INDUSTRY AND THE PIONEER PUBLICATION IN ITS FIELD

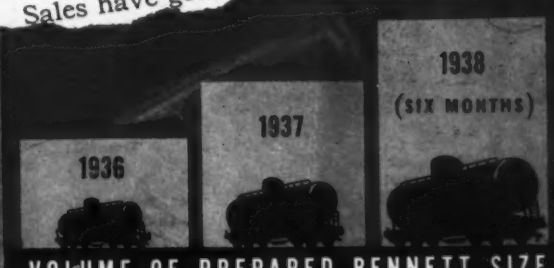
FRONT PAGE NEWS

SALES OF BENNETT SIZE UP 22%

Consumption of Bennett Size for first 6 months of 1938 shows continued increase

Despite general recession in the paper industry, the consumption of Bennett Size has shown a marked increase for the first six months of this year. Sales have gone ahead ... more equip-

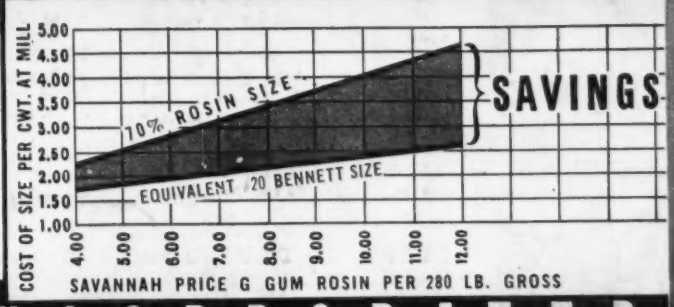
NUMBER OF BENNETT DISPERSION MACHINES IN OPERATION IN U. S. PAPER MILLS



VOLUME OF PREPARED BENNETT SIZE SOLD TO U. S. PAPER MILLS

Here is the explanation—

BETTER PAPER AT LOWER COST



BENNETT INCORPORATED
CAMBRIDGE • MASSACHUSETTS

REPORT OF SUPERINTENDENTS' CONVENTION

JUNE 30 1938

Vol. CVI
No. 26

A SINGLE OBJECTIVE . . . . . *Economy*

A SINGLE RESPONSIBILITY IN ACHIEVING IT

The Republic Flow Meters Co. offers a complete manufacturing and engineering service in the field of measurement and control. We will be glad to co-operate with you in the solution of any metering or control problem, whether it involves a single instrument or the automatic control of an entire process or plant. Your inquiries will involve no obligation on your part.

ELECTRICAL FLOW METERS. For metering the flow of steam, water, gas, air, oil, brine, etc. The reading instruments, indicator, recorder and integrator, are remote reading and can be supplied singly or in any combination desired.

MECHANICAL FLOW METERS. A simple mechanical meter, indicating, recording and integrating the flow of fluids.

CO_2 METERS. Provides a continuous record of per cent CO_2 in flue gas measured by the orsat method. Furnished with either mechanical or remote reading indicator and recorder.

DRAFT INSTRUMENTS. Indicating or recording types in single or multiple units. Furnished in all standard ranges of draft and pressure.

THERMOMETERS. A long distance, expansion type thermometer with either single or multiple pen recorder.

LIQUID LEVEL INSTRUMENTS. Remote reading indicators and recorders. Also provided with various types of alarm and control devices.

MULTI-POINT INDICATORS. Will indicate, on separate horizontal scales from two to sixteen units of draft, pressure, flow, temperature, CO_2, etc., in any combination desired.

MULTIPLE RECORDERS. Will record on a wide strip chart from three to six separate records of flow, temperature, CO_2, pressure, etc., in any combination desired.

PANEL BOARDS. Master instrument and control panels are designed and built for any combination of instruments and controls desired.

BOILER CONTROLS. A centralized, automatic system for controlling steam pressure, combustion, furnace pressure, excess pressure, boiler level, etc. Automatically regulates the fuel and air input to a boiler in measured proportions and in a fixed ratio for the entire load range.

DESUPERHEATERS. A venturi type desuperheater wherein the rate of water flow is controlled by the steam flow in correct proportion to reduce the steam temperature to the degree desired.

REGULATING VALVES. Turbine type valves designed for regulating the pressure and flow of liquids and gases including high pressure superheated steam. Built in accordance with A.S.A. standards for all pressures up to 1,500 lbs. per sq. in.

REGULATORS. For the automatic control of pressure, draft, rate of flow, rate of fuel feed, speed of rotation, liquid level, etc. For proportioning two pressures or flows. Regulators may be either air or oil operated.

STEAM ACCUMULATORS. Designed and built to meet your specific requirements for the storage of high and low pressure steam.

DESCRIPTIVE DATA BOOKS MAILED UPON REQUEST

★

REPUBLIC FLOW METERS CO.

Entered as second class matter at the Post Office at East Stroudburg, Pa., under the Act of Congress of March 3, 1879. Published every Thursday by the Lockwood Trade Journal Co., at 34 N. Crystal St., East Stroudsburg, Pa. Executive and Editorial office: 15 W. 47th St., New York, N. Y. Domestic subscription U. S. and possessions, $4.00 per year.

THE REAL COST OF A PACKING

is determined only by its

LENGTH OF LIFE IN SERVICE

and

Its Effect on Rod or Shaft

Experience has shown that the labor charge, the time wasted, the stoppage of production, far out-weigh the actual cost of the packing.

PACKINGS

FOR THE

PULP and PAPER INDUSTRIES

CUTNO PACKING
For pumps handling caustic soda, kraft and black liquor, sulphate, all alkali pumps and digesters.

PALMETTO PACKING
For steam, compressed air, bleach liquors, sulphite, sizes, sulphate.

The lubricant in each brand has been especially compounded to resist the action of the liquids or gases pumped.

The lubricant is forced hot under pressure into each single strand before braiding. This keeps the packing soft and pliable on rods and shafts.

PELRO PACKING
For solvents, oils and waxes, fuel oil.

SQUARE KLERO PACKING
Stainless, for white paper, stock pumps, jordans clean water pumps. Lessens dirt.

Send for A B C Chart of Services. Also Free working sample. State size of packing used and conditions of service.

GREENE, TWEED & CO.

Sole Manufacturers

109 Duane Street New York

SQUARE PALCO PLAITED PACKING
Made of high tensile strength cotton. For centrifugal and triplex pumps.

SUPER CUTNO PACKING
For pumps handling sulphuric and all heavy acids, digesters.

3 FEATURES *of the control-flow* CYLINDER VAT *for* BOARD MACHINES

1

RANGE

The control features of this vat permit a wide range of weights from light weight liner to heavy filler sheets.

2

FOAM ELIMINATION

The vat design and the type of pumps furnished provide for the elimination of troubles from foam.

3

FORMATION

The formation at all weights from light to heavy sheets is controlled by means of the moveable internal design.

A Combination Liner-Filler Vat

WRITE FOR FURTHER INFORMATION

THE BAGLEY AND SEWALL COMPANY

PAPER MAKING MACHINERY

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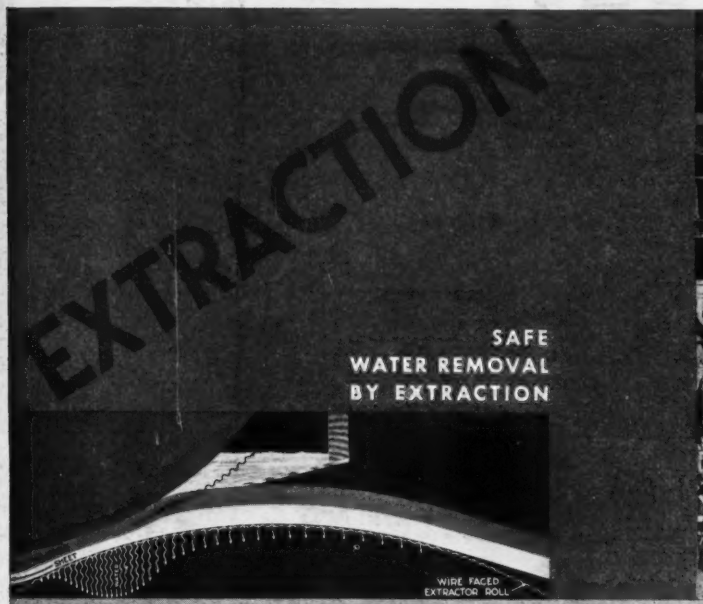
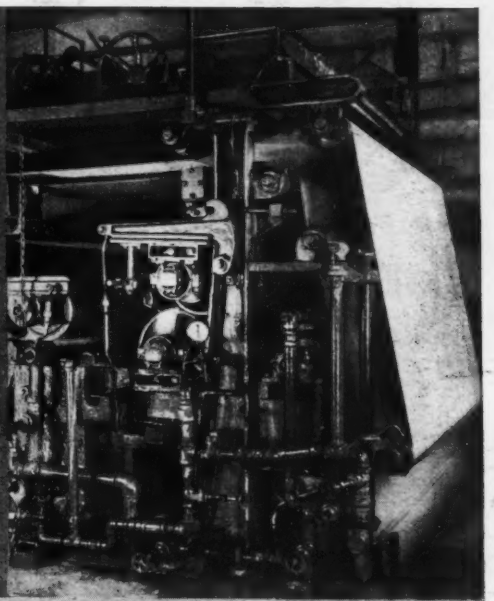
E. W. COLE, 1028 Clinton Street, Kalamazoo, Michigan
H. M. SUTTON, 10 Forrest Avenue, Haverhill, Massachusetts

BAGLEY B&S SEWALL

WATERTOWN, NEW YORK

DOWNINGTOWN





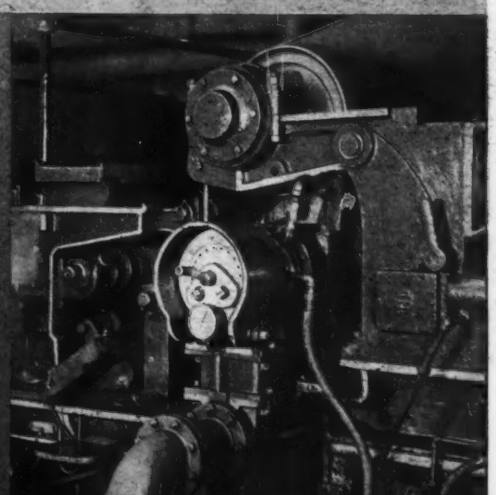
DUO-DEHYDRATION

The photographs show the Downingtown Extractor Unit (above) and the Downingtown Suction Press Roll (below) at the Covington, Va. Mill of West Virginia Pulp & Paper Co. The diagrams illustrate how this modern Duo-Dehydrating Principle eliminates crushing and thus safely removes large quantities of water before the sheet enters the dryers. Send for Catalog No. 119 which shows various Duo-Dehydrating Press Part arrangements and tells the experiences of several users. The Downingtown Mfg. Co., Downingtown, Pa.

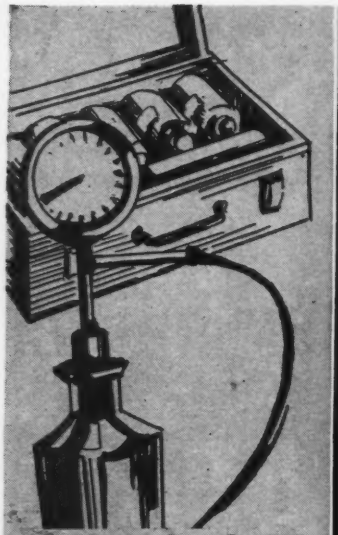
WEST VIRGINIA PULP AND PAPER CO.

STRAIGHT LINE
WATER REMOVAL
BY SUCTION

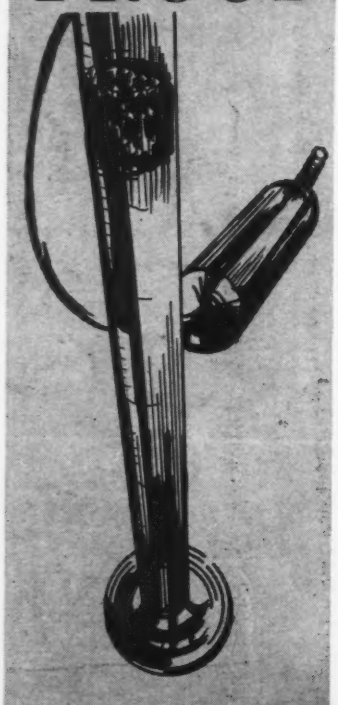
SUCTION



No Board Machine is Modern *Without* DUO-DEHYDRATION



PROOF OF ADKA SAVEALL RESULTS *before* INSTALLATION



NOT a single one of the 13 ADKA White Water Savealls sold in the United States in the past two years has had to be taken on *faith* alone.

In every case a portable test kit, which exactly duplicates ADKA performance on a small scale, has given an advance demonstration of what the ADKA can do.

Because these simple tests are made in the client's own plant—on fresh white water samples from his own paper machine—they give convincing evidence that:

- **ADKA effluent is of unusual clarity—ranging from only 0.03 to 0.2 lbs./1000 gallons of total suspended solids.**
- **High percentage recovery of stock and filler is obtained—even if the white water was formerly difficult to treat.**
- **"Sweetener" stock is unnecessary—in fact, has no place in ADKA performance.**

Experience with over 200 ADKAs throughout the world has shown that these tests on 50 cc. samples will accurately predict the results obtainable from an ADKA installation.

Why not ask our engineer to make such a demonstration for you?

DORRCO

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ENGINEERS • 570 Lexington Ave., New York

ATLANTA • TORONTO • CHICAGO • DENVER • LOS ANGELES

DORR TECHNICAL SERVICES AND EQUIPMENT ARE ALSO AVAILABLE FROM THE FOLLOWING COMPANIES:

NETHERLANDS: Dorr-Oliver N.V., The Hague • ENGLAND: Dorr-Oliver Company Ltd., London • GERMANY: Dorr Gesellschaft, m.b.H. Berlin • FRANCE: Soc. Dorr-Oliver, Paris
ITALY: S.A.I. Dorr-Oliver, Milan • JAPAN: Sanki Eng. Co., Ltd., Tokyo • SCANDINAVIA: A.B. Hedemora, Hedemora, Sweden • AUSTRALIA: Crossle & Duff Pty. Ltd., Melbourne
ARGENTINA: Luis Fiore, Buenos Aires · SOUTH AFRICA: Edward L. Bateman Pty. Ltd., Johannesburg · BRAZIL: Oscar Taves & Co., Rio de Janeiro

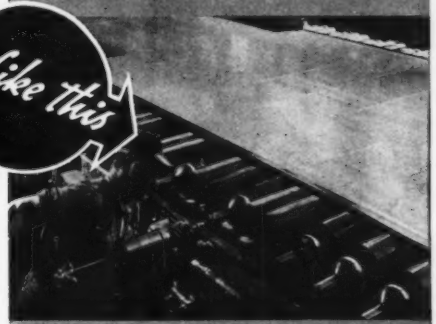
AFTER YOU INSTALL MODERN EQUIPMENT *Like this*

Make sure

GULF QUALITY LUBRICANTS
ARE ON THE JOB

Gulf supplies a special lubricant for hypoid gear drives on the back side of this modern paper machine.

Like this



The Gulf grease being applied here to wet-end roll bearings stays in the bearings and does not work out along the rolls.

"We insured our new equipment against operating difficulties and repair expense the first day production started in our new mill," says this superintendent. "Gulf quality lubricants were placed in service as recommended by the Gulf engineer."

That's the best kind of "production insurance" you can buy for your mill. When the proper oils and greases protect the moving parts of each machine, production delays and costly repairs are few and far between.

Ask the Gulf engineer who calls at your plant to check over the lubrication of all your equipment and suggest possible improvements. From a broad line of 553 quality oils and greases, he will recommend the lubricants best suited to each requirement—and suggest the proper methods of application.

This careful attention to lubrication is helping scores of mills reduce maintenance and repair costs. Why not take advantage of this money-saving service in your mill?

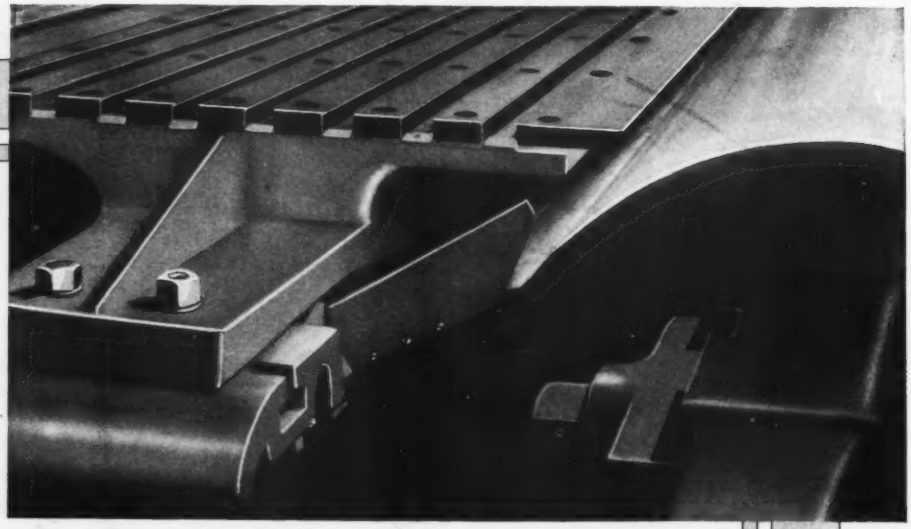
Like this

This modern mill reports high operating efficiency from this Diesel engine with Gulf lubricants and fuel oil in service.

GULF OIL CORPORATION
GULF REFINING COMPANY
GENERAL OFFICES: GULF BUILDING, PITTSBURGH, PA.

GULF INDUSTRIAL LUBRICATION

Here is the most effective of all formation tables



The new Black-Clawson Fourdrinier has many exclusive features and right up there among the best is the patented Kutter formation table. No table on the market can equal it for preventing rapid rushes of water through the wire . . . with resulting operating economies and formation improvement.

What makes the Kutter formation table so effective? For one thing, it consists of a deeply ribbed lightweight casting supporting micarta strips which form specially designed sloping slots for water removal. These slots prevent the upthrow of water back into the sheet and tend to remove the water gradually.

Another advantage lies in the support it gives the wire where the liquid weight is the greatest. That is, it lies closer to the breast roll than does the first table roll in the conventional layout, thereby shortening the usual long unsupported wire section at that point. A table roll also deflects in the center . . . something that the Kutter formation table does to no appreciable degree. Thus is provided a level and uniform forming surface at this very important place.

This table also permits the more gradual laying of fibers on the wire. By delaying the rush of the water through the wire, the fibers have more time to cross and weave together, forming a firmer mat.

The Kutter patented formation table is only one of several outstanding Black-Clawson Fourdrinier developments . . . for example, the B-C improved flow box and the B-C multi-sectional table roll section. All of these can be installed on your present equipment one at a time if necessary. By following this Black-Clawson "step-by-step" plan, operating efficiency can be increased without financial strain. When you are finished, however, your Fourdrinier will be of long-life, noncorrosive metals . . . of simplified construction . . . and easier to handle and control.

For more complete information, write the Black-Clawson Co., Hamilton, Ohio. Owners of Shartle Brothers, Middletown, Ohio.

BLACK-CLAWSON

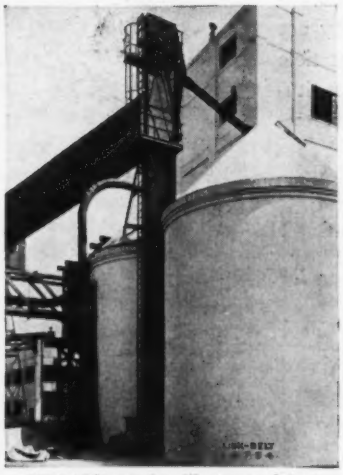
● Profit by the ideas gained from thousands of practical cost-cutting installations handling every conceivable kind of material and employing all types of conveying and power transmitting equipment.

● Link-Belt makes them all, and recommends and applies each where it serves best. General Catalog No. 700 contains 1248 pages of engineering data. Send for your copy. Address the nearest office.

LINK-BELT

• Elevators and Conveyors •

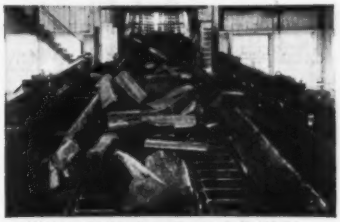
Belt Conveyor handling chips



Bucket Elevator handling raw sulphur

Screw Conveyor handling pulp

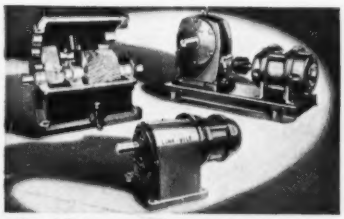
Hogged Fuel Conveyor



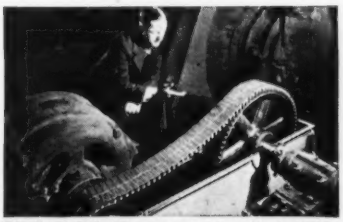
Picking Table Conveyor over chippers

• Positive Drives •

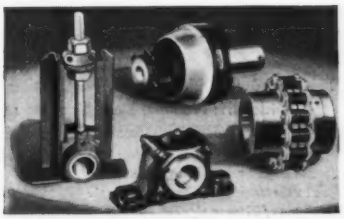
and Power Transmission Equipment



Speed Reducers—Worm, Herringbone and Motorized types



The Link-Belt Silverstreak Silent Chain Drive



Take-ups, Clutches, Gears, Couplings

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The Leading Manufacturer of Equipment for Handling Materials and Transmitting Power 71281

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OPACITY · WHITENESS · BRIGHTNESS

From Baby Bonds to Billboards...

BETTER PAPER with LESS FILLER

TITANOX-A and Titanox-B-30 answer the paper-maker's demand for better, more economical fillers. Whether they are used in bond or book stocks, tissues, utility stock or in any other, they definitely improve the qualities of opacity, whiteness and brightness of the paper with minimum loading.

These modern pigments give to paper a degree of whiteness and brightness never before obtained and mask any discoloration. They are chemically inert, have extremely fine particle size and will not react with any other constituent of paper. Because of their inertness, after-yellowing is minimized. When applied as a beater addition, they are well retained and are adaptable to various surface treatments and coating processes.

Titanox pigments are the modern filler for modern paper. Are you using them?

TITANOX-A is pure titanium dioxide, which is the most opaque and whitest white pigment obtainable. It represents the greatest hiding power available in opaque white pigments. It is particularly recommended for stocks in which opacity, whiteness and brightness must be produced with a minimum of pigment.

TITANOX-B-30 (Titanium Barium Pigment) is titanium dioxide combined with an inert base. It gives exceptional opacity, whiteness and brightness at lower cost, and is especially applicable to all types of paper in which higher pigmentation is permissible.

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Sole Sales Agent

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Our Service Department will be glad to consult with you on the technical details involved in the use of Titanox pigments.

TITANOX TRADE MARK

TITANOX

DE-INKS! DE-WAXES!

DE-COLORIZES!

MAKE YOUR OWN PULP FROM WASTE PAPER

THE SILCO PULP PRODUCTS COMPANY announces that the first commercial unit is in successful operation on a commercial and economical scale at

THE O. B. ANDREWS COMPANY
CHATTANOOGA TENNESSEE

Low conversion costs in processing all grades of waste paper including books, colored ledgers, wax paper, print manilas, blue print paper, newspaper, fly leaf shavings, and other grades.

The Process is suitable for book mills, boxboard mills, tissue mills, and specialty mills.

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Mr. E. H. Silberman - President

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WEST COAST HEMLOCK PULP
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FOR PULP, NEWSPRINT, BOOK, KRAFT

GOOD CHEMICALS MAKE GOOD PAPER

Aluminum Sulphate

• DU PONT ALUMINUM SULPHATE is a paper makers' alum—used in precipitating rosin and clarifying process water—it is manufactured to meet the critical requirements of the paper maker. • Always uniform in its chemical and physical properties. Lump and Granulated.

Silicate of Soda

• This superior mineral loader has become "standard" in many mills. Its use increases retention of other fillers and sizes, improves formation and printing qualities of the paper and prevents "whiskers."

Tri-Sodium Phosphate

• In DU PONT TRI SODIUM PHOSPHATE you will find those proven qualities that make it the choice for cleaning felts, as water softener, detergent and emulsifying agent for making up size.

Salt Cake

• DU PONT Salt Cake plays an important part in the manufacture of proper cooking liquors in the production of Kraft Pulp . . . it has repeatedly won the approval of the recovery room operators, for sulphate pulping operations.

OTHER DU PONT CHEMICALS FOR PAPER MANUFACTURERS

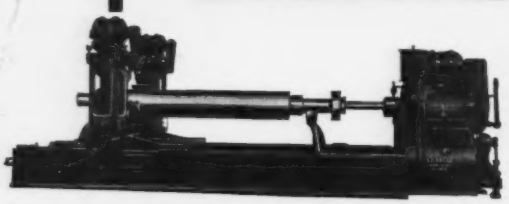
Barium Carbonate
Barium Chloride
Barium Sulfate
Caustic Soda
Soda Ash
Lead Acetate
Muriatic Acid
Sulfuric Acid
C. P. Reagents

E. I. DU PONT DE NEMOURS & CO., INC.
GRASSELLI CHEMICALS DEPARTMENT
Wilmington, Delaware

DU PONT Chemicals

GOOD CHEMICALS MAKE GOOD PAPER

LOBDELL



ROLL GRINDER

The Lobdell is the only grinder with: 1. Automatic Crowning Device with single micrometer setting. 2. Closed Geared Head and Automatic Lubrication throughout. 3. Provision for Leveling Bed to compensate for foundation change and wear. 4. Rigid Wheel Mountings, with support under wheels for all roll diameters.

Now, with the addition of the V-Belt Wheel Drive, it has no equal for complete accuracy, efficiency and economy.

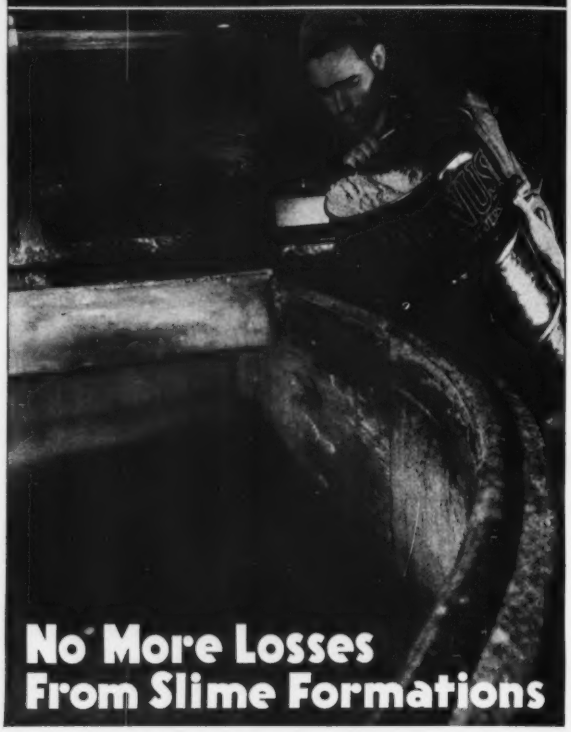
This new V-Belt Wheel Drive has these important advantages: Gives greater rigidity to wheel-mounting — Eliminates belt-lift on hinged wheel-mounting while crowning device is in operation — Increases power — Eliminates vibration-producing belt-splices —No obstructions to placing any length roll directly upon journal stands from overhead crane or trolley.

Complete information in literature that's yours upon request. Investigate! — It's been worth while to over 70 different paper mills.

LOBDELL CAR WHEEL CO.

WILMINGTON, DELAWARE
102 Years in Business

How To Operate Paper Mills More Profitably



Fungus and bacteria growths must be ***killed*** to prevent slime formations in paper mill machinery, pipe lines, etc. In addition, slime spots, breaks, poor quality stock and many other difficulties as well as losses, present themselves when slime is present in the system.

MAGNUS SLIME REMOVER

is the only practical agent that completely disintegrates slime growths, loosening and dissolving them for easy riddance by simply flushing the system. This simple method does away with expensive, time-wasting methods, and eliminates costly scraping, taking apart of machinery, piping, etc. MAGNUS SLIME REMOVER also retards slime growths by preventing them from getting a foothold, thereby greatly reducing the frequency of cleaning operations. Divorce yourself from slime nuisance. All that you need to do is: 1—Add MAGNUS SLIME REMOVER to the beater; 2—Pump through the system.

FREE

Handbook of Paper Mill Cleaning Operations. Send for your Free copy TODAY.

Other MAGNUS Materials for use in Paper Mills:

MAGNUS FELTEX—for felt cleaning and conditioning.
MAGNUS HYDREX—beater assistant.
MAGNUSOL—for cleaning machinery.
MAGNUS SUCTION PRESS ROLL CLEANER.
MAGNUS No. 58—for use with starch sizes and coatings.

MAGNUS CHEMICAL COMPANY

Manufacturers of Cleaning Materials, Industrial Soaps, Metallic Soaps, Sulfonated Oils, Emulsifying Agents and Metal Working Lubricants.

24 SOUTH AVE. GARWOOD, N. J.

MAGNUS CLEANERS

CRANE PLUG DISC VALVES

FOR HEAVY-DUTY SERVICE IN PULP AND PAPER MILLS

● At a pressure of 300 lbs. and a temperature up around 550° F., steam can make short work of a valve that must be operated partly open —unless that valve is designed specifically to meet all those conditions. For this strenuous service, Crane will back its No. 382P Plug Disc Valve against the field. Here's the sturdiness to stand up, month in and month out, under the abuse of running steam continuously through a valve in throttling service. Here's the combination of design and materials that means faithful performance and a tight, sure seat, in service involving frequent opening and closing. Why? It's what's inside these 382P's that counts. It's the right mixture of brains and metals—backed by Crane's 80 years of knowing how to build valves right —checked by every test the Crane laboratories could devise—and proved by the experience of users everywhere. It will pay you to look "inside" a Crane 382P valve, see for yourself why its design is right and its metals chosen to resist *every* condition of use. "The Inside Story of Crane Plug Disc Brass Valves" tells you in a few, full-of-fact pages how Crane designs and builds these valves to give you uncommon service. Send for a copy today.

CRANE

VALVES · FITTINGS · PIPE
PLUMBING · HEATING · PUMPS

CRANE CO., GENERAL OFFICES: 836 SOUTH MICHIGAN AVENUE, CHICAGO

NATION-WIDE SERVICE THROUGH 134 BRANCHES AND MORE THAN 500 WHOLESALERS

The No. 382P—one of the 15 types of Crane's brass plug disc valves

IT'S WHAT'S INSIDE THAT COUNTS.

PAPER MAKING MACHINERY

Fourdrinier Paper Machines
Quick changing wire features

Cylinder Paper Machines for all grades of board

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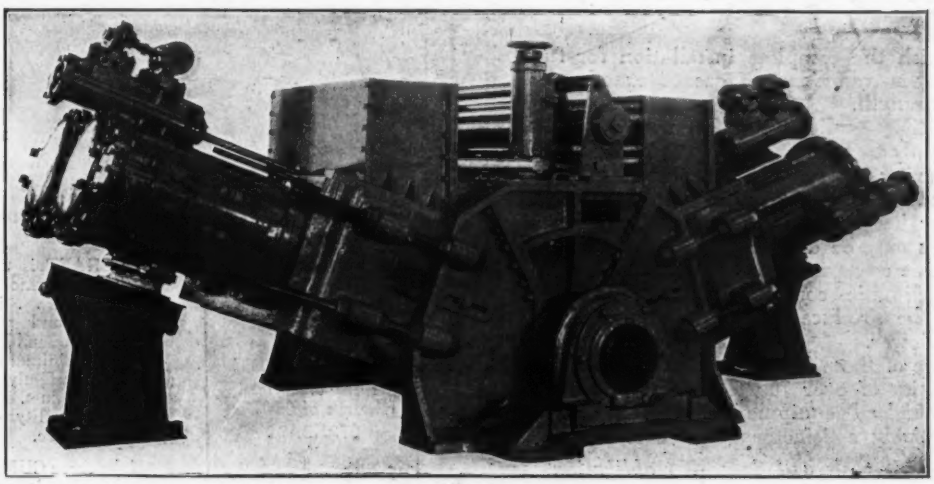

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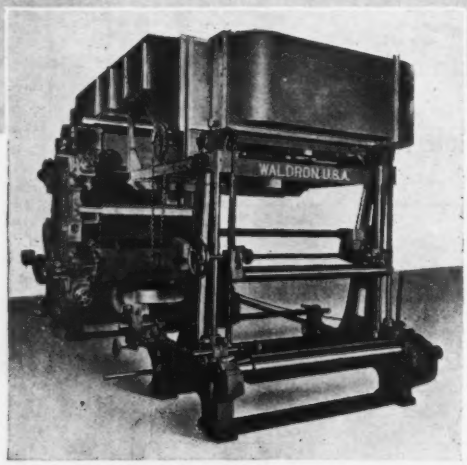

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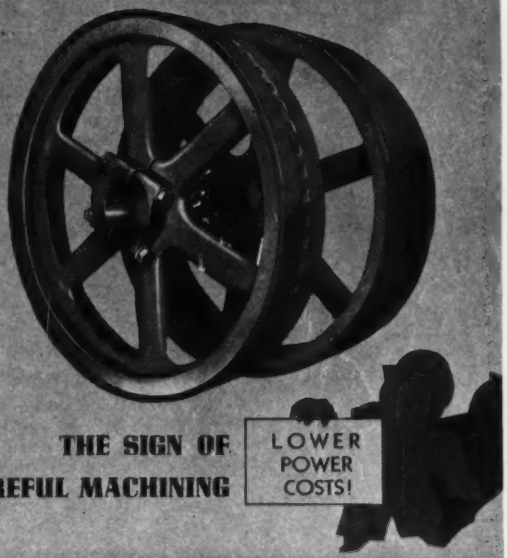

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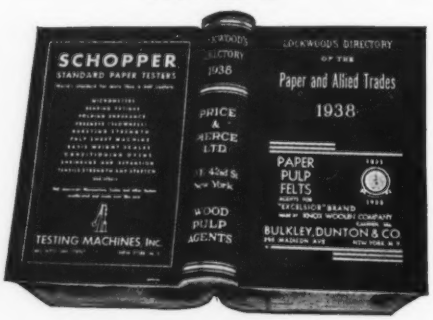

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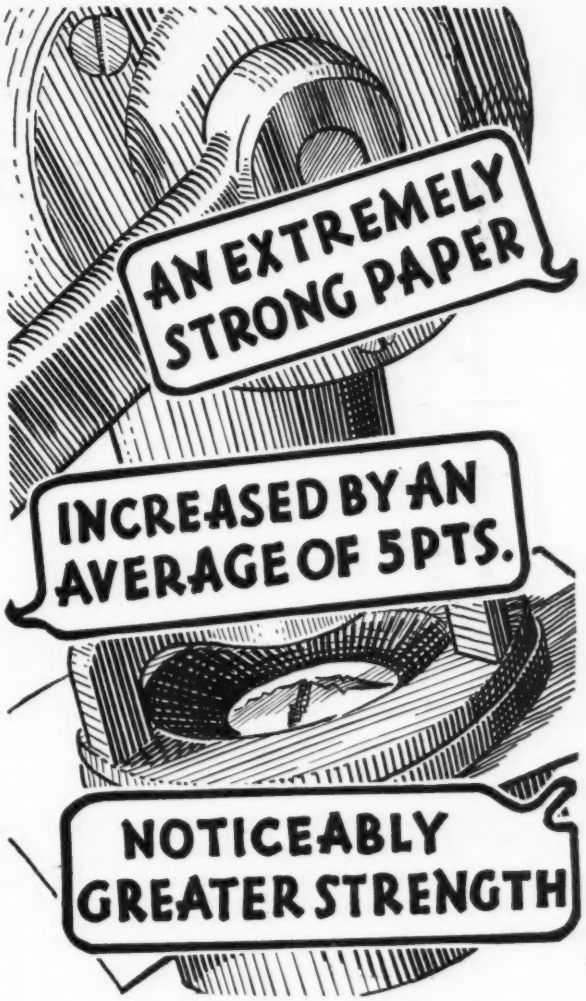

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PAPER TRADE JOURNAL

THE INTERNATIONAL WEEKLY OF THE PAPER AND PULP INDUSTRY AND THE PIONEER PUBLICATION IN ITS FIELD

Published Every Thursday by the LOCKWOOD TRADE JOURNAL CO., Inc.

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TABLE OF CONTENTS

Superintendents Hold Convention at Toronto 25
Pulp and Paper Machinery and Supply Firms Exhibit at Toronto, Ont. 30
Those Who Attended the Convention 46
Government Paper Bids 52
Manufacturers Cooperate to Grow Pulpwood 54
Obituary 56
Midwest Paper Trade Looks Ahead to Fall... 58
Financial News of Pulp and Paper Industry.. 60
Construction News 64
Editorial **66**
Technical Section
The Control of Variables on High Speed Newsprint Operation 69
The Development of the Art of Trimming Paper 73
A Comparison of Modern Methods of Coating Paper 76
Recovery of Heat and SO_2 Gas in the Sulphite Pulp Industry With or Without Heat Exchangers 78
The Development of Modern Wage Incentives 81
The Control of Printing Quality in the Paper and Board Mill 86
The Maintenance Engineer in a Pulp and Paper Mill 90
Operating Results of the New Type Black-Clawson Wet End 92
Efficiency in Paper Making 94
Screening Pulp Fibers 98
Effect of Starch on the Printing Quality of Board 100
Particle Size Distribution As It Affects Properties of Coating Clays 102
Historical Green Bay to Welcome TAPPI .. 104
Imports of Paper and Paper Stock 105
New York Market Review **108**
Miscellaneous Markets **110**
Market Quotations **112**

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SIXTY-SIXTH YEAR

PAPER

Established Feb. 17, 1899
Consolidated Nov. 16, 1899
with Paper Trade Journal.

Vol. CVI, No. 26 Thursday, June 30, 1938

Established Sept. 21, 1918
Consolidated Feb. 19, 1925
with Paper Trade Journal.

SuperintendentsHoldConventionAtToronto

American Pulp And Paper Mill Superintendents' Association Meets For The First Time In Canada—F. L. Zellers, Of The French Paper Co., Niles, Mich., Is Elected President—Exhibit Of Machinery Is Impressive.

[FROM OUR SPECIAL REPRESENTATIVE]

TORONTO, Ont., June 27, 1938—The Nineteenth Annual Convention of the American Pulp and Paper Mill Superintendents' Association was held at the Royal York Hotel, Toronto, Ont., June 22-23-24, 1938. It was the first annual convention of the organization to be held in Canada and from the fine reception accorded to all delegates and the hearty request to return, it was the general opinion that it would not be long before the superintendents would march even in stronger numbers across the border again.

Convention Largely Attended

About 800 delegates, their wives and friends, attended. the trip to Toronto was made by car, train and boat, thus enabling those who wished to visit mills en route, a splendid opportunity to do so before the actual proceedings of the convention opened.

Paper Mill Machinery Exhibit

The morning of the opening was given over to registrations and the visitation of the exhibits, and right here, let it be recorded the exhibitors went one better than on previous conventions in making their displays more attractive, interesting and instructive. The exhibition hall was located on the same floor as all meetings, luncheons, dinners, etc., which brought it out into greater prominence. Furthermore, they jumped the gun on the convention by holding an Exhibitors' Dinner arranged by the Exhibitors' Committee of the paper Industry in the ball room on the evening previous to the Convention opening. Short addresses were given by B. D. Millidge, president of the American Pulp and Paper Mill Superintendents Association, George Craigie, convention manager, and J. W. Hemphill, chairman of exhibitors' committee.

F. L. ZELLERS
President

Morning Session

The morning session got under way about 11 A. M. when President B. D. Millidge called the first business session to order.

Invocation was offered by Rev. J. B. Paulin, pastor of the Rosedale Presbyterian Church Toronto.

A brief "In Memoriam" was conducted by R. L. Eminger, national secretary during which Rev. Paulin offered a short prayer for members of the association who had passed on during past year.

President's Address

The address of welcome was extended by T. H. R. McNally, head of Toronto Tourist and Convention Bureau. F. L. Zellers thanked Mr. McNally, after which the delegates listened intently to address of President Millidge which follows:—

"Welcome to Canada. The expression is not original but the wish is sincere, To a great many of you, it is not new because you have had the opportunity of visiting this country frequently.

Our two countries enjoy friendly relations with our three thousand miles of undefended boundary, and our common language, which enables us to feel equally at home on either side of the border line. We are pleased that you have come to this convention, and sincerely hope that you will enjoy your stay in Toronto and profit by the convention here. It is fitting that the nineteenth annual convention should be held in Canada during my term of office as president. Thank you for this honor.

"The year 1937-1938 has witnessed a material increase in the activities of the association. The membership drive previously instituted has been continued and the increase in membership has been 110 compared with 103 in 1936-1937. This increase over the past two years indicates that the Superintendents' Association is performing a recognized function in the pulp and paper industry and is bound to grow.

Southern Division Reorganized

"The Southern Division was reorganized in April of this year. A successful meeting was held in Jacksonville, Florida, and in Brunswick, Georgia. We feel that this unit will function well as the officers elected are interested and efficient. We look forward to the continued progress of the Southern Division.

"The last year book was the largest and best we have published. It has been beneficial to the superintendents and to the advertisers in the increased distribution among paper mill operators.

A Change in Management

"A change in the management policy of the national convention has been instituted this year. George Craigie, the field secretary of the association, is convention manager, and it is hoped that the results obtained here this week will show the advantage of having one well-qualified officer responsible for the management of the convention. I am deeply indebted to Mr. Craigie for the active co-operation he has given me in the membership drive, the re-organization of the Southern Division, and in the planning and management of this convention.

"Our secretary-treasurer, Mr. Eminger, has performed his duties faithfully and well, and has made the year book the most successful in the history of the association.

A. B. C. DREW
Second Vice president

"The division chairmen and their assisting officers are to be congratulated on the way in which they have organized the work of their divisions and maintained the interest of their members.

Excellent Cooperation

"I wish to thank *The Paper Mill*, the official organ of the Superintendents' Association, for editorial publicity; the other trade papers have also been very co-operative; the Allied Industries which have contributed materially to the success of our meeting, we appreciate their co-operation and the vital technical information which they bring to us. The officers of the Superintendents' Association appreciate the excellent co-operation given to us by the Canadian mills.

"The value of the machinery and supplies exhibit cannot be over-estimated. The exhibitors have an opportunity to show us what is new and the superintendents to visit these exhibits and take back to their mills the latest improvements.

"Just at present, conditions in the pulp and paper

H. H. HARRISON
First Vice president

OSCAR STAMETS
Third Vice president

industry, in common with all other industries, are rather clouded; nevertheless, the present situation cannot last for an extended period and I am convinced that, in spite of the present set-back, a favorable future is assured. New uses for paper are continually being developed and improvements in manufacture are being made, necessitating changes in equipment and supplies. Products of the pulp and paper industry are comparatively quickly consumed, and the need for knowledge and ability to direct it is ever increasing and to this end the Superintendents' Association will play an important role in this progress and development.

Serious Problems

"We must, however, acknowledge the fact that the industry is confronted with some serious problems which will have to be dealt with and some fair and sound solution found to those problems before it can make its proper contribution to our economic life.

"No industry or business can prosper unless it can, over a period of time, pay fair wages to its employees, pay a fair rate of interest on its capital and provide for the proper upkeep of its plant, so that continuous operations might be assured.

"To this end both labor and capital are concerned —one cannot function without the other—and it is, therefore, essential that not only capital should be willing to accept reduced dividends during such depressed conditions as we are now going through, but that labor should also make its fair and honest contribution so that the ship may weather the economic storm and all on board be saved.

"Taxes are increasing steadily and it is to be hoped that something will be done by the people of this continent to regulate government expenditures so that taxes will not be imposed entirely on industry but that a more fair and equitable basis of distribution so that people will realize how much of their income is being expended in that way.

"To contend with the problems of modern industry, the necessity of education for the operator is becoming increasingly important. It is extremely important that the superintendents foster an educational programme. They have to put forth every effort to improve their knowledge by attendance at meetings and conventions, as well as by careful reading of trade journals so that they will be fully equipped to assume the responsibility which modern industry places upon them.

L. S. McCURDY
Fifth Vice president

"The American Pulp and Paper Mill Superintendents' Association does foster education and does function for its members in providing means for obtaining and distributing the knowledge required by pulp and paper mill superintendents. To this end it has been developed, and in this service it will thrive."

Luncheon, June 22

A men's luncheon was held in the concert hall at which L. F. Winchell, vice-president and general manager of Hinde & Dauch Paper Co. of Canada, Limited, of Toronto, Ontario, presided as toastmaster. The principal speaker at this luncheon was B. J. Sandwell, Editor *Toronto Saturday Night.*

In the afternoon at a general conference President B. D. Millidge presiding, the following papers were presented: "The Development of Modern Wage Incentives" by Alexander Strong of Rath & Strong, Inc., Engineers, Boston, Mass.; "Continuous Grade

GROVER KEETH
Fourth Vice president

R. L. EMINGER
Secretary-Treasurer

Costing in a Paper Mill" by Donald Ross-Ross, chief industrial engineer, Howard Smith Paper Mills, Ltd., Cornwall, Ont.; "Efficiency in Paper Making" by B. L. Kassing, Hammermill Paper Company, Erie, Pa.

Boat Ride on Lake Ontario

E. J. Thom, chairman of the boat committee and members of his committee were in full charge of a very enjoyable moonlight ride on the Canada Steamship Company S.S. *Cayuga.* Most of the delegates took advantage of this trip as the weather was excellent and many provisions for entertainment had been provided including the returns by radio of a blow by blow description of the Louis-Schmeling fight. Among some of the entertaining features were dancing, Bingo, horse racing as it is done on board ship, and singing by various groups of the delegates, more or less impromptu, but which harmonized with the general good spirit of the trip.

Group Meetings, June 23. Morning Session.

The following group meetings were held Thursday morning: Chemical Pulp, Plant and Power Engineers, Fine and Coated Papers, Tissue, Board and Finishing, Storing and Shipping News and Wrapping.

Friday Morning Session

On the morning of June 24 many of the delegates visited the exhibits while final committee groups met before the closing of the convention. After luncheon at which George Carruthers, president of the Interlake Tissue Mills Co. Ltd., Merritton, Ont. spoke with his usual good humor, and at which R. A. McInniss, president of the Canadian Pulp and Paper Association, delivered a very fine talk, a general conference was held in the ballroom with President B. D. Millidge presiding.

The New Officers

The new officers elected were as follows: F. L. Zellers, president; Howard H. Harrison, first vice-president, Arthur B. C. Drew, second vice-president; Oscar Stamets, third vice-president, Grover Keeth, fourth vice-president, L. S. McCurdy, fifth vice-president, R. L. Eminger, secretary-treasurer; George W. Craigie, field secretary.

Sports Events

Next to the Royal York Hotel in importance at the convention was the St. Andrews Golf Course where many of the delegates spent considerable time in the broiling sun to compete for the excellent prizes to be distributed by many of the manufacturers. About 175 superintendents and their guests played the eighteen holes, some with surprisingly low scores, in spite of the fact that the course was a sporty one and the temperature was recorded as 90 degrees in the shade.

There was also bowling and aquatic sports at Sunnyside. Considerable interest was shown in skeet shooting. E. C. Jacobi won first prize. S. S. McCurdy and B. V. Ball were next in the scoring while Mrs. B. D. Millidge, Mrs. R. W. Hines and Mrs. Jacobi finished in that order.

Harold Crabtree Toastmaster

On Friday night at the close of the convention there was a formal joint banquet in the Concert Hall, on the convention floor of the Royal York Hotel. Harold Crabtree, president of the Howard Smith Paper Mills, Ltd. was the toastmaster at the banquet. The guest speaker was the Hon. Howard Ferguson, former Premier of Ontario and former Canadian High Commissioner to Great Britain.

A feature of the banquet was the presentation of the Past President's Jewel and also the L. D. Post Memorial Trophy to the retiring President Brydone D. Millidge.

The music was furnished by Stanley St. John and his orchestra.

Papers in Technical Section

Most of the papers presented at the convention are printed in this week's issue of the PAPER TRADE JOURNAL, beginning on page 59.

Industrial Research Men Meet

Industries in the fields of textiles, iron and steel, optical and other instruments, paper, soap, home appliances, chemicals, etc., were represented at meetings of the newly organized Industrial Research Institute held at the Hotel Dennis, Atlantic City, N. J., Friday and Saturday, June 17-18, with Robert B. Colgate, vice-president in charge of research for the Colgate-Palmolive-Peet Company, of Jersey City, N. J., presiding.

Executives directing industrial research for their companies participated in round table discussions dealing with administration, organization and personnel problems of their scientific research laboratories. Improvement of the general efficiency of laboratory administration and methods of increasing the return on the research investment were subjects discussed by the executives attending the meeting. Surveys along these lines will be conducted by the Institute during the summer.

O. A. Pickett, director, Hercules Experiment Station, Hercules Powder Co., Wilmington, Del., presided at a round table discussion on research organization, and Donald Bradnor, director, Research and Development Department, Champion Paper & Fiber Co., Hamilton, Ohio, was chairman of a round table dealing with personnel.

Maurice Holland, Director, National Research Council's Division of Engineering and Industrial Research, and acting executive of the Institute, said that another project contemplated is to co-operate with American colleges and universities so that these institutions can train scientific research workers along lines required by actual industrial experience.

Bert White, vice-president, The Liberty Bank of Buffalo, Buffalo, N. Y., which operates a research advisory service in the interests of their clients, told the delegates that bankers today are becoming more conscious of the importance of research in the development and stabilizing of industry.

Champion Paper Entertains Printers

DAYTON, Ohio, June 27, 1938—Forty members of the West Side Printers Association of Cleveland, Ohio, were guests of the Champion Paper and Fibre Company Thursday and Friday of last week.

The guests arrived Thursday night in a chartered bus and registered at the Anthony Wayne hotel. They spent Friday visiting the mill and offices of the Champion Paper and Fibre Company and enjoyed golf and a steak fry late Friday afternoon and evening at the Elks country club, Middletown pike. They returned the following Monday.

THE WHYS AND WHEREFORES OF DEFINITE PREFERENCE FOR

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CHEMISTS:— prefer Stora 32 because they know with these fibres they can both improve papers and develop new grades.

MILL SUPERINTENDENTS:— prefer Stora 32 because they know it is uniform and clean. They never worry over "making the grade" when Stora 32 is on hand to bring up any test.

PURCHASING AGENTS:— prefer Stora 32 because they know there is better value in its top quality and real co-operation and service back of a Stora contract.

SALES MANAGERS:— prefer Stora 32 because they then know their papers are superior and therefore hold their business, as well as make it possible to get new accounts even when orders are scarce.

EXECUTIVES:— prefer Stora 32 because they know the advantages of a strong connection and how important it is to their freedom from worries to have operating troubles eliminated.

STORA KOPPARBERG CORPORATION

230 Park Avenue, New York City

Pulp and Paper Machinery and Supply Firms Exhibit at Toronto, Ont.

Allis-Chalmers Mfg. Co.

The Allis-Chalmers Manufacturing Company, Milwaukee, Wis., at its exhibit featured a new speed changer unit which has just been put on the market by the Texrope Division and which is said to open up new horizons in variable speed transmission. It utilizes the already well known principle of that company's multi-groove vari-pitch sheaves. The new speed changer consists of a ruggedly constructed very compact type of unit applicable to all manner of industry. This totally enclosed unit, designed with double shaft extensions and driven from a standard motor, provides the flexibility that makes it adaptable to a wide variety of layouts to suit the individual application. Where the change in speed is to be adjusted manually only, the unit is provided with a readily accessible hand wheel control. However, the unit can be equipped for electric remote control. Manual remote control is also possible. The present range of capacities now being offered includes ratings up to 33 horse power with ratios as high as 3¾ to 1. It is expected that larger ratings will be developed in the future.

The new Allis-Chalmers speed changer unit has been designed to fill the need for equipment in any industry where a substantial change in speed is desirable to better control production. It is especially applicable where material handling equipment must be controlled. Exhibition units are being shown at the principal national trade expositions. Descriptive bulletin 1266 may be obtained from their nearest district office.

American Brass Co.

The American Brass Company, Waterbury, Conn., and Anaconda American Brass Limited, New Toronto, Ont., presented an exhibit portraying the uses of copper and its alloys in the pulp and paper industry. Among the items displayed were copper tubes and fittings; phosphor bronze wire; Everdur tanks, bolts, screws, conduit and other manufactured parts; welded samples and welding rods; condenser tubes; bronze screens and screen cloth; Beryllium copper, etc. Service engineer R. S. Burr represented the American Brass Company, while G. T. Berner and others were present from the New Toronto branch.

Bagley & Sewall Co.

The Bagley & Sewall Company, Watertown, exhibited several parts of paper mill equipment, together with moving pictures during convention hours, which showed the manufacturing of paper mill equipment, as well as paper making machines in operation in the mills. They featured a working model of the "Quick Wire Change Fourdrinier" which was built to ¾ inch scale, representing a machine with a wire 90 feet long, 140 inches wide. Three scale model Simplex shake units were attached and operated by an electric motor. Other equipment consisted of the Bagley & Sewall new control flow cylinder vat model, which was an aluminum cast vat end, built to a reduced scale, but with the partitions attached and the controlled features arranged for hand operation. They also showed the Simplex shake unit with its casing cut away and the inside of the housing illuminated to enable the observer to view the operation of its working parts. Another piece of equipment was the vertical adjustment anti-friction bearings and horizontal adjustment mounting for table rolls. A Bagley & Sewall double wall head drier with chromium plated surface was exhibited in the booth of the Chromium Corporation of America. Representatives of The Bagley & Sewall Company in attendance were Edward S. Lansing, Harry C. Kinne, Roy F. Hayes, Frank M. Sanger and Hugh M. Sutton.

Barkon-Frink Tube Lighting Corp.

The Barkon-Frink Tube Lighting Corporation, 23-10 Bridge Plaza So., Long Island City, N. Y., announced that the convention marked the first anniversary of the introduction of Barkon Carbon Dioxide color matching lamps to the pulp and paper industry. The equipment, manufactured by the concern, was exhibited in Booth 53. Three models of the lamp, designed particularly for the various requirements of the industry, were shown. The lamps in operation made a striking display and attracted considerable attention from exhibit visitors as well as the technical men directly concerned with this aid to accurate color control. Mr. McGinnis and Mr. Scribner, the company representatives in attendance at the booth, stated that the lamps are rapidly becoming standard equipment in the pulp and paper industry. The maintenance of an unvarying quality of light, closely approaching average north sky light, throughout the entire long life of the lamps, was cited as the principal reason for the adoption.

Barrett-Cravens Co.

The Barrett-Cravens Company with general offices and factory at 3255 West 30th Street, Chicago at its exhibit showed the Barrett lift trucks, both the single and the multiple stroke type. The company also showed an electrically operated portable elevator used for the double-decking of skids so as to utilize overhead space and to have floor space available for more productive purposes.

Bauer Bros. Co.

The Bauer Brothers Company, Springfield, Ohio, had an exhibit that featured photograph of its larger machines and contained one of its Classifiers. Samples and data concerning the work that all of their machines do were interestingly displayed. The McNett Classifier attracted attention because it was filled with water and connected so that it showed in all essential respects the appearance of the machine when it was actually classifying stock. The outstanding feature of this classifier seems to be the ease and rapidity with which a sample can be divided into four fractions for weighing and one fraction by difference.

Classification, or as it is sometimes called "frac-

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BELOIT IRON WORKS
Beloit, Wis., U. S. A.

BELOIT IRON WORKS PAPER MACH'Y BELOIT, WIS., U.S.A.

tionation", itself is gaining in popularity as the importance of the information it gives about the condition of the stock going onto the machine at any one moment, is better recognized. The extreme difference between the properties of the fractions separated from one paper mass was interestingly shown by sheets, numerical data, and graphic curves. The Classifier sells for $385.00, f.o.b. Springfield, Ohio, complete and ready to run.

Some interesting samples were shown of the stock made by the pulpers which this firm manufactures. These are double revolving disc machines, the two discs running in opposite directions and being connected directly to shafts of two motors built special and mounted integral with the machine base. This pulper is capable of refining ground wood or kraft rejects so that they can be put back into No. 1 stock or of refining any other rejects so that they can be made into good paper stock. It can also take chipped wood, after soaking or steaming, and make a good mechanical pulp from it.

Very similar to this machine, in fact identical as to construction but different as to plates and feed, are the double revolving disc refiners which this firm makes. Samples of stock refined for the paper machine by this refiner were also shown.

The Bauer Brothers Company are also manufacturers of a line of single disc pulpers and refiners. The single disc pulpers are used for either fibrating hard materials preparatory to final pulping, or for the pulping of the softer materials that do not require such high speed disc action as is obtained in the double disc pulpers. The single disc refiners are used in stuff preparation and are built either with special motor built into the frame and assembly or with motor mounted on a separate base as the case requires.

The pulp shredder is another piece of equipment made by this concern. It is a machine provided with two special steel rolls running in the same direction at different speeds. These rolls carry fingers or prongs that tear the sheet or lapped pulp apart so that it goes to the beater in more nearly prepared condition. Firms using this machine find that it saves ⅓ of their beater time.

The exhibit was in charge of A. S. Cosler, sales manager. Charles L. Bauer, president, was in attendance at the convention, as was also Jonathan Markley, one of their field men who erects and installs pulp, paper and wall board equipment.

Beloit Iron Works

The Beloit Iron Works, Beloit, Wis., exhibited two models one illustrating the Beloit horizontal dual press which is now in successful operation on over thirty machines in the United States as well as several machines abroad. This type of press replaces either two or three conventional presses and makes room for at least four additional driers or makes it possible to length the Fourdrinier wire to obtain more forming surface. The model illustrated the felt run as well as the paper run through this unique press.

The other model illustrated the latest type Beloit patented removable Fourdrinier and showed how the wire is strung in the aisle while the machine is in production if desired. The wire bundle is taken out of the shipping box and placed directly in clamped saddles in the wire carriage. The wire is not touched by hand and instead of unreeling the wire bundle over the Fourdrinier pit this new arrangement make it possible to merely move the wire carriage down the aisle which automatically unreels the wire bundle and the inside wire poles which are inserted in the carriage at the beginning of the operation are placed into position as the carriage moves down the aisle. It is not necessary to pull the wire by hand or any other means thus there is no possibility of creating a wrinkle in the wire and because of the simplicity of this arrangement only a few men are required to change a wire. This type of quick wire changing Fourdrinier was designed particularly for the wide machine having exceptionally long wire. There are several of these Fourdriniers now in operation having wires over 200 inches wide and up to 120 feet in length.

The background of Beloit's booth contained several enlarged photographs each illuminated by indirect lighting to good advantage. These included the Beloit Yankee Machine with an actual photograph showing the mirror finish on the Beloit Yankee Drier of special mixture and produced by special polishing equipment. The Beloit suction drum press for cylinder machines was illustrated by an enlarged installation photograph, also an enlarged photograph showing installation of the Beloit horizontal dual press were featured. V. S. Denison, C. E. Macklem and T. C. Roberts were in attendance at the booth.

Bird Machine Co.

The Bird Machine Company exhibited Bird products including screens, felt conditions and doctors. F. K. Becker, vice-president of the company, was in attendance at the booth.

Bristol Co.

The Bristol Company, Waterbury, Conn., exhibited a representative group of Bristol's instruments for close control in various pulp and paper mill processes. This company's new line of round-chart potentiometer pyromasters was featured. A pyrometer and resistance thermometer, with a transparent cover for the operating mechanism, were on display. These models served as an easy means for explaining the operation of the five basic units of the pyromaster, which provide for a simplified and compact operating mechanism, installed in a Bristol's standard round-chart instrument case. A bulb-and-system type time-temperature controller, with the recorder in a separate case, was also featured. A typical speeded-up control cycle was demonstrated using the controller and a cam to operate a cut-away synchro diaphragm valve. These instruments also served to demonstrate the operation of Bristol's free-vane system of pneumatic control. Instruments from a complete line of flow meters, recording voltmeters and ammeters, and tachometers were also exhibited, in operation.

A. E. Broughton & Co.

A. E. Broughton & Co., Glens Falls, N. Y., demonstrated the new Broughton fuzz collecting system by a complete Broughton Fuzz Collector set up ready for operation. This new system collects all the fuzz and dust scraped off by the doctor blade on the first bottom drier of any paper machine and carries this accumulation either directly into the sewer through water sprays or into a suitable collector room. It

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eliminates the carryover of the dust into the balance of the paper machine and also into the machine room and goes a long way toward cleaning up the paper. This Fuzz Collector is oscillated by the aid of the new Broughton oscillator, operating either from vacuum supplied from the couch or press vacuum pump or by air pressure from the mill supply. These little oscillators are built in three sizes and in any necessary stroke. Where the doctor blades to be moved are very heavy, a novel, anti-friction radial bearing is supplied in which the oscillator is mounted. A Broughton unit vacuum controller, cut apart for display, and together with large drawings made an easy explanation of the operation of the Broughton unit vacuum control system, which is now operating on about 340 paper machines in the United States and Canada. The flat box vacuum pumps are eliminated and an individual control of the vacuum on each box is set up.

Cameron Machine Co.

The Cameron Machine Company, 61 Poplar Street, Brooklyn, N. Y. exhibited rolls slit on various types of camachines and pictures of some of these modern slitting and winding machines. A complete file of Cameron literature was available. In attendance at the booth were J. Scheuerman and J. B. Venturini.

Canadian Ingersoll-Rand Co., Ltd.

The Canadian Ingersoll-Rand Company, Ltd., New Birks Building, Phillips Square, Montreal, at its booth featured an animated exhibited of the Vickery Doctor. A Type 30 Vacuum Pumps, which, in addition to being on display, will also provide a vacuum for oscillating the Vickery Doctor. A range of pneumatic tools of the types used in and outside the mill. A Motor Pump as used for general mill service. In addition, the exhibit included a complete photographic display of other Canadian Ingersoll-Rand products, including "Bird" machinery, which is manufactured in Canada by this company, Haug Refiners, etc.

Chromium Corp. of America

Chromium Corporation of America in its exhibit included Crodon-plated flat and curved screen plates and samples of chromium-plated slice lips, suction box covers, apron boards and rolls of various types. There was also on display a welded steel Crodon-plated drying drum as well as plated cast iron rolls. The exhibit was in charge of E. R. Granger of the Waterbury plant, and H. L. Garvens of the Chicago plant.

Crane Co.

Crane Company featured its 8 inch paper stock valve. Representing Crane Company in the booth were T. H. Ireland of the Chicago office and H. W. Vallis, assistant to the manager of the Toronto branch of Crane Ltd.

Duriron Co.

The Duriron Company of Dayton, Ohio, exhibited a line of Durimet, Durco KA2S and Durco KA2SMo (stainless steel) castings for use in pulp mills. Durimet is a nickel-chromium alloy steel especially resistant to weak sulphuric acid. For the paper mill, Duriron pumps, valves, pipe and fittings, dissolving jets and similar equipment for handling alum and hypochlorite bleach were shown. C. F. Stanton of the Boston office and W. A. Watkins of the Buffalo office were in attendance, as well as representatives of Shawinigan Chemicals Ltd., Duriron licensees for Canada.

Electric Tachometer Corp.

The Electric Tachometer Corporation, manufacturer of indicating and recording tachometers, and electric and mechanical counters, Broad and Spring Garden Streets, Philadelphia, exhibited a group of instruments of special interest to paper mills. Particular emphasis was placed on the latest model of speed recorder manufactured by this firm, which was shown in operation. This recorder, used by leading Paper Mills in U. S. A. and Canada for many years, is especially designed to record speed, production, and operation of any machine, and to show starts and stops. Using a waxed chart, with steel stylus, no ink, ribbon, or carbon paper are required, thus eliminating constant servicing, and each chart provides for three weeks' continuous operation. The speed or production curve is made by measuring distance traveled or revolutions made during definite time periods, usually of ½ minute interval. The equipment is essentially an automatic repeating and recording counter. It gives the same data as would be obtained by an observer who measured the exact production or distance for each time interval, and plotted these amounts as a speed curve. In addition, the totalizer sums up the production for any number of hours, or days, in any required unit of measure. The results are said to be more accurate than would be obtained by an observer with a stop-watch as the measuring, starting and stopping are all done by means of electric contacts. In addition, a group of indicating tachometers, hand tachometers, mechanical and electric counters were displayed. The company was represented by M. F. Porter and C. H. Clapman.

Foster Wheeler Ltd.

Foster Wheeler Limited, head office and works St. Catharines, Ont., exhibited Trimbey Centrifugal Pulp Screens. Heat recovery equipment for paper mills, as designed by the Foster Wheeler Corporation,, New York, also was featured. In attendance were George Macnoe, president, Foster Wheeler Limited, Pell W. Foster, Jr., Foster Wheeler Corporation, New York and Roger Trimbey of the Trimbey Machine Works, Glens Falls, N. Y.

Foxboro Co.

The Foxboro Company, Foxboro, Mass., featured an instrument whose sensitivity responds to a breath of air. By breathing on one of the hygrometer elements of a Verigraph moisture controller, a deflection of the instrument indicator could be obtained, corresponding to the change in moisture content of the air surrounding the element. A section of the hygrometer was cut away to show the sensitive element which indicates any change in moisture content of the paper being run. Also displayed were a pulp grinding controller, a pneumatic loading instrument for calender stacks and press rolls, and other instruments applicable to the paper industry. In attendance from the Foxboro Company were: M. B. Hall, manager Pulp and Paper Division; J. G. Callan, sales engineer; and E. B. Beede, sales engineer.

"La Moisson De Colza, La Recolte Du Colza" by Jules Adolphe Breton—Courtesy of The Corcoran Gallery of Art, Washington, D. C.

"The Harvest is in the Seed"

THE PUSEY AND JONES CORPORATION, WILMINGTON, DELAWARE

From the sales representatives for the Foxboro Company in Canada, Peacock Brothers, Ltd., the show was attended by: F. R. McDonald, executive representative; F. A. Lucas, manager, Toronto office; and F. L. Shonkwiler, sales engineer.

L. H. Gilmer Co.

The L. H. Gilmer Company, Philadelphia, Pa., exhibited its line of belts and belting for paper mill drives. This included Gilmer V-belts in a full range of sizes for fractional horsepower and multiple use, and Kable Kord Flat belting in both endless and non-endless form. Kable Kord represents the "two-belts-in-one" feature combining a contactor element with a power element to form a belt for which is claimed more strength, tighter squeeze of the belt against the pulleys, and longer resistance to stretch. Both belts were shown in Oil Resistant construction also for use on installations subjected to the destructive action of oil. In attendance at the exhibit were A. B. MacFarland and Paul M. Wright.

B. F. Goodrich Co. of Canada Ltd.

B. F. Goodrich Rubber Company of Canada, Limited, displayed a model of a rubber covered couch roll, 3 feet long and 16 inches in diameter with internal bearings and showing molded anchors. These Goodrich couch rolls need no mechanical means of attachment, it was revealed. They are soft rubber all the way to the core because of the exclusive Goodrich Vulcalock process of bonding rubber to metal, resulting in 25 per cent to 40 per cent more usable rubber, or cushion wear. Another item shown at the exhibit was a model of the Goodrich "Dukbak" table roll showing its high polish and consequent water repellent qualities; also a model of a bleach washer drum showing the attachment of division and drainage strips. Several samples of rubber-lined pipe and fittings used in handling bleached pulp stock were also shown. Among the officials of the company who were present at the convention were: E. Peterson, manager, paper industry sales from the parent company's Akron, Ohio, office; Harry Cox, Montreal representative of the B. F. Goodrich Rubber Company of Canada, Limited; J. A. Fisher, Toronto representative; and D. Douglass from the mechanical rubber goods division of the Canadian Company's head office at Kitchener, Ont.

W. & L. E. Gurley

W. & L. E. Gurley, in connection with their Canadian representative, The Hughes-Owens Company, exhibited the following paper testing instruments:—Cobb Sizing Tester, Gurley-Hill S-P-S Tester (softness-porosity-smoothness), Gurley R. D. Smoothness Tester, Gurley R. D. Stiffness Tester, Gurley Dumpy Level and the Gurley Engineer's Transit. In attendance were J. L. Sanders, of the Hughes-Owens Company, and R. G. Betts, of W. & L. E. Gurley.

International Nickel Co. of Canada, Ltd.

The International Nickel Company of Canada, Ltd., featured the established applications of Monel, nickel alloy cast irons and nickel-chromium iron alloys in pulp and paper mills. Monel-covered rolls which are being used in increasing number by United States mills, are now being furnished in Canada by the Dominion Engineering Company, Ltd., Montreal, Que. A Monel-covered wire roll produced by "Dominion Engineering" was one of the principal exhibits. Items such as Monel pulp screen plates, wire cloth, save-all trays, suction boxes, and ferrous nickel alloy blow pipes, valves, chipper lips, etc., were on display by courtesy of the following manufacturers: Canada Iron Foundries Ltd., B. Greening Wire Company, Jenkins Brothers Ltd., Johnson Wire Works Ltd., Rice, Barton & Fales, Inc., Robert Mitchell Company, Ltd., Shawinigan Chemicals Ltd.

In attendance were representatives of the International Nickel Company and their Toronto representatives, Messrs. Peckover's Ltd. In charge were E. A. Turner and T. E. Lagerstrom.

Johns-Manville Corp.

Johns-Manville Corporation, 22 East 40th Street, New York, as a leading feature of its exhibit made a demonstration of the flexibility of the Simplex couplings used on Transite asbestos-cement pipe. With the pipe under pressure, an oscillating unit moved the coupling in a circular fashion, and yet the joint remained bottle-tight. This test showed but one of the ways in which Transite water pipe makes possible new economies in water transportation. Other factors described in the J-M display included the relatively light weight of the pipe, its resistance to soil corrosion, and its immunity to tuberculation and electrolysis. Flat sheets of Transite—also of asbestos-cement composition—are used extensively throughout the paper industry in the construction of paper machine hoods. Also represented at the exhibit were J-M insulated rotproof roofs, which are widely used to solve condensation problems on beater and machine rooms. Other features of the display were the complete lines of packings, gaskets, friction materials, insulations and refractory cements which Johns-Manville has designed to meet any service on all types of pulp and paper mill equipment. Products of especial interest to the paper industry were "Eel-Slip," a new J-M bearing material slippery as its name implies and which is used for suction box covers, doctor blades, etc., and J-M Celite No. 263 for the control of pitch trouble.

Samuel M. Langston Co.

The Samuel M. Langston Company, manufacturer of paper working machinery, Camden, N. J., did not exhibit any of its machinery but occupied an attractive booth in which were shown enlargements of photographs and a background of the company's trade mark in connection with slitters and rewinders, which also included reference to the fact the firm manufactures equipment for producing spiral tubes or cores and equipment for producing corrugated shipping containers.

Arthur S. Leitch Co.

The Arthur S. Leitch Company Limited of Toronto presented a very interesting display of the following:

An operating demonstration of Johnson Rotary Pressure Joints as used for paper machine calender and drier rolls. These joints are manufactured in Canada at their plant in Toronto and in the United

States by the Johnson Corporation of Three Rivers, Mich.

An operating demonstration of Armstrong steam traps which are manufactured for the Canadian market at the Leitch plant in Toronto and in the United States by the Armstrong Machine Works of Three Rivers, Mich.

Goulds paper stock pumps manufactured by the Goulds Pumps Inc., of Seneca Falls, N. Y.

Sections of pipe and fittings of Toncan wood lined pipe manufactured by the Michigan Pipe Company of Bay City, Mich.

Alco Unit Heaters and Alco Centrifugal Pumps manufactured by the Arthur S. Leitch Company Limited, Toronto.

Models of the Cram syphon installator, a patented device for inserting syphon pipes into calender drier rolls, this device being manufactured by H. G. Cram of Appleton, Wis.

The exhibit was in charge of Kelvin D. Leitch and Mr. A. D. McKinney of the Arthur S. Leitch Company Limited, Toronto; R. O. Monroe of the Johnson Corporation, Three Rivers, Mich.; and Otto Ulrich of the Armstrong Machine Works, Three Rivers, Mich.

Link Belt Co.

Link-Belt Company, 307 N. Michigan avenue, Chicago, exhibited the following:

A motorized P.I.V. Gear variable speed transmission unit, in operation, with tachometer for speed indication.

A Silverstreak silent chain drive operating in a dust-proof oil-retaining casing.

A Scene-in-Action unit of the Link-Belt Roto-Louvre Drier, showing the incoming hot air and gentle rolling action of the material as the drier drum revolves.

Samples of anti-friction belt conveyor idlers; conveyor chains; Silverlink roller chain; anti-friction and babbitted types of bearings, and other power transmission units.

Installation pictures of conveying and power transmission equipment.

Link-Belt representatives in attendance included H. F. Weber, Chicago; Mike Parykaza, Chicago; H. D. Mitchell, Philadelphia; John Farley, Montreal; Neville Ward and others from the local Toronto office.

Macbeth Daylighting Co., Inc.

The Macbeth Daylighting Company Inc., manufacturer for the scientific production of daylight, 227-39 West 17th street, New York, exhibited its complete line of Color Identification Lamps. These lamps included the AKP82 two variant Daylight and Horizon-Sunlight lamp, the BKX83 and the BSXV8. Norman Macbeth and Benjamin J. King were in attendance at the exhibit.

Mason-Neilan Regulator Co.

The Mason-Neilan Regulator Co. of Boston and Mason Regulator Company of Canada, Ltd., of Montreal occupied Booths 59 and 60 and displayed automatic control equipment applicable to the pulp and paper industry. Of particular interest was Mason-Neilan Stock Level Control, Tenso-Temp Moisture Control for paper drying, Exact-A-Load Control and Weir Meters.

The Stock Level Controller was an operating unit actuating a Diaphragm Control Valve particularly suited for handling stock having a Saunders Patent valve body. The Tenso-Temp Drying Control was also an operating unit showing the method of control with automatic break and manual operating features.

The Mason-Neilan Weir Level Recorder and Flow Integrator demonstrated the simplicity of this type of equipment available for procuring a record of weir head and totalized flow of white water to sewer. The Mason-Neilan Exact-A-Load Controller showed the application of this unit for the purpose of properly loading and controlling the loading on press rolls, calender and super-calender rolls.

Equipment was also shown for maintaining liquid level in condensate tanks and the like. The Mason-Neilan line of diaphragm control valves with specialized features for properly graduating the flow and reducing wire cutting action was also exhibited. Other items exhibited included indicating and recording temperature controls, pressure controls, flow meters and controls, together with various types of pressure regulating valves.

Nash Engineering Co.

The Nash Engineering Company, South Norwalk, Conn., showed the following: A small Nash Hytor vacuum pump, similar to those used for flat box and suction roll service throughout the industry. The pump was disassembled to permit inspection of the internal design and construction. The suction and discharge ports are on the surfaces of two cones which fit inside of the conical hollows at either end of the rotor. These pumps have only one moving part, namely the rotor, mounted on a shaft carried in ball bearings outside the casing. There are no metal to metal contacts and consequently wear is reduced to a minimum. They are built in three types, one for low vacuums up to about 10 inches mercury, another for general suction roll service involving vacuums from 10 inches to 20 inches of mercury, and a high vacuum type for suction rolls or other applications where a greater degree of vacuum is necessary. These vacuum pumps may also be staged to secure very high vacuums for special processes.

A Nash Hytor chemical pump, so designed that the internal parts can be made of special alloys to withstand corrosion. Inlet and outlet ports are both in the head and the lobe, head and cone are arranged for clamping in a cast iron frame. These pumps may be used either as vacuum pumps or compressors. Pressures up to 75 lbs. can be obtained with water as the sealing medium. With a seal heavier than water, higher pressures may be obtained.

A Jennings centrifugal pump, single stage design, double suction type, close coupled to an electric motor. The unique feature of this unit is the fact that the supporting pedestal is located between the pump and motor, preventing possible misalignment of the bearings due to pipe strain. The stator of the motor may be removed without disturbing the rotor or disassembling the pump. Likewise, the pump impeller may be inspected and removed through the end cover without disturbing any piping. Suction and discharge connections may be provided in various positions to simplify the piping layout. These pumps

show the high efficiencies usually associated with Nash equipment. Besides regular cold water pumping services, this unit can be used to draw liquid against a vacuum without danger of air binding.

A Jennings combination air and water pumping unit of the type which forms a part of the drier exhaust unit. It comprises a small Nash Hytor vacuum pump and a centrifugal condensate pump, having rotor and impeller mounted on the same shaft supported in ball bearings outside the casing. The unit can be furnished mounted on a base, direct connected to a motor. The base can also accommodate a tank for separating the air and water. This type of equipment is rapidly replacing direct acting steam pumps since the latter are expensive to maintain and deliver the air along with the condensate to the hot well or feed water heater. The Jennings unit effectively de-aerates the water and thus reduces corrosion in return lines and boilers. Besides the above equipment, several enlarged photographs showing actual installations and interior parts of large vacuum pumps were exhibited.

Paper Makers Chemical Co.

The Paper Makers Chemical Company's exhibit consisted of a display of the extensive series of chemicals for use in paper making. Beside these products, the exhibit included a showing of the various types and colors of papers. Many of these have appeared in issues of *The Paper Maker*, and proved to be of considerable interest to delegates.

Paper Makers Importing, Inc.

The Paper Makers Importing Company Inc., Easton, Pa., at its exhibit presented an electric display machine containing posters mounted on rollers showing the mining, preparing, storing and shipping of our Cornish and American clays. The company also had on display samples of the crude clays and samples of the refined clays. The representatives in charge of the exhibit were J. D. Volckman, S. D. Brian and V. B. Case.

Penick & Ford, Ltd.

Penick & Ford, Ltd., Incorporated, 420 Lexington avenue, New York, had an attractive display of the 18 distinctly different types of products manufactured from corn. Prominent in this exhibit were the special products which are extensively used by the paper industry. These items included Clearsol gum for tub-sizing, Douglas beater starch, Douglas special pearl, No. 3115 calender starch and No. 499 dextrine for laminating.

Pulp & Paper Mill Accessories, Ltd.

Pulp & Paper Mill Accessories Ltd. in its exhibit mainly featured the Neilson patented paper machine slice. The slice on display was one ordered by the E. B. Eddy Company of Hull, Que., to be used in the manufacture of book paper, etc. Displayed with the Neilson slice were different types of rubber li showing the type of material used when this equipment is used on various grades of paper. The plastometer ranged from 10 up to 50 P & J. A complete suction box, with one of the new P.A.P.A. patented wax impregnated end-of-grain maple suction box covers was shown, as well as several sections of regular end-of-grain cover.

Other items on display in this company's booth were:

Dolmar Bow Saw. Permitting a log to be cut up to 26 inches without binding. This saw is entirely automatic and is almost as foolproof as it is possible to make a saw of this type.

Stainless Steel Castings. Manufactured by Fahralloy Canada Limited of Orillia, Ont. A very fine piece of work, showing a difficult impeller.

Lodding Flexible Doctor with adjustable blade This doctor is made of corrosion resisting material throughout.

Hi-Speed Suction Box Surfacing Machine—with tungsten tipped steel knives.

Marblex Table Rolls. Manufactured by the Manhattan Rubber Manufacturing Division of Passaic, N. J.

Other companies represented by Pulp & Paper Mill Accessories Limited in Canada are:

Valley Iron Works Company, Appleton, Wis.; Dolmar Machinery Company; Fez Company Limited; Lodding Engineering Corporation, Worcester, Mass.

A complete line of paper mill equipment is handled by this firm for both the Canadian and American mills.

Rice, Barton & Fales, Inc.

Rice, Barton & Fales, Inc., Worcester, Mass., were located in Booths No. 28 and No. 29 and had an interesting collection of photographs showing the numerous kinds of equipment they manufacture for the paper industry. These included photographs of high speed paper machines, high capacity pulp drying machines, Minton vacuum driers, and particularly photographs of the paper machine recently installed at the mill of the Consolidated Water Power and Paper Company, which coats the paper on the paper machine. Photographs of auxiliary equipment were also exhibited. A model of a new development known as the Ziegler felt guide was exhibited, and this model illustrated the simplicity and the workings of this guide. A small model drier was shown in conjunction with a new type of siphon installator, and a new type of siphon pipe having an ejector nozzle, which is a part of a simplified drier drainage system. The latest type of steam joint for use on paper machine driers was shown, the features of the joint being the oilless self-aligning disc and ball thrust bearing. S. B. Stafford and G. A. Peterson, sales engineers of the company, were in attendance.

Rollway Bearing Co., Inc.

The Rollway Bearing Company, Syracuse, N. Y., exhibited a complete range of standard bearing types in a variety of sizes. These included cylindrical roller thrust and radial bearings of the heavy duty, precision type, also commercial steel cage type bearings with solid rollers. Of particular interest was an 8 inch aligning type roller bearing for drier cylinder rolls, its capacity being 120,000 lbs. at 120 r.p.m., the normal operating speed. There was also displayed photographs of outstanding Rollway bearing installations on paper mill equipment, as well as copies of drawings, layouts, etc., for many typical applications, such as jordans, pulp grinders, drier cylinders, couch rolls, flat screens, breast rolls, press rolls, calenders, etc. Representatives of the Rollway Bearing Company in attendance at the con-

vention were: C. B. Sawyer, New England representative; A. G. Sawyer, New York representative; W. H. Float, general manager; J. H. Evans, chief engineer; J. E. Sero, assistant chief engineer.

J. O. Ross Engineering Corp.

The J. O. Ross Engineering Corporation, 350 Madison avenue, New York, and Ross Engineering of Canada, Limited, in their booth provided a comfortable lounging place for their many friends in the industry. There were numerous photographs of various types of installation on exhibit showing recent developments in the pulp and paper field. A. B. Clark and S. W. Fletcher were present from the New York office; A. E. Montgomery represented the Chicago office and F. W. Hooper, Ross Engineering of Canada, Limited, Montreal.

Joseph T. Ryerson & Sons, Inc.

Joseph T. Ryerson & Son, Inc., Chicago, sponsored an interesting and educational exhibit of Ryertex non-metallic bearings. An attractive electrically illuminated display panel outlining the features of Ryertex bearings served as a background for the exhibit. A generous display of bearings was shown—some of them new, others having been in service for many months, the latter giving convincing evidence of long wearing quality and other money saving characteristics. Also included were several panels of enlarged photographs showing actual installation of Ryertex bearings on jordans, bleachers, grinders, press rolls, beaters, etc., as well as drawings explaining various installations in detail. In attendance at the Ryerson booth were: K. T. MacGill, F. W. Vogt, D. B. MacLeod.

Sandy Hill Iron & Brass Works

Sandy Hill Iron and Brass Works, Hudson Falls, N. Y., displayed for the first time a full size running model of its latest 6-plate "Packer" screen with non-corrosive metal vat, frame, and flowbox for the bevel type of screen plate. Although the new metal parts of this screen were made of Everdur it can also be constructed of any other non-corrosive material such as stainless steel, Monel, nickel clad steel, or Armco. In addition to the screen, a neat little working model of the Sandy Hill Bertram shake, built to scale and glass covered to show the working parts, with a variable speed motor attached, also created considerable interest. A new Sandy Hill motion picture was shown several times on the manufacturing process of paper and pulp machinery. This picture contains some unusually clear foundry scenes which hitherto have presented difficulties in taking because of the lack of commercial lighting equipment available. There were also on display, pictures of the various types of machinery which the Sandy Hill Iron and Brass Works manufacture and descriptive bulletins. Paper Machinery Limited of Montreal, who shared part of the Sandy Hill booth, had available various models of the Kamyr machines. Their display featured the Kamyr feltless wet machine, the Kamyr continuous pocket grinder, the Kamyr rotary suction box, the Kamyr pressure filter, and other outstanding pieces of equipment.

Service Caster & Truck Co.

The Service Caster and Truck Company, Albion, Mich., showed a new portable electric lifter, especially adapted to paper roll handling; the hydraulic paper roll truck—a new four-wheel hand model equipped with swinging nose and a hydraulic cylinder backing the frame and acting as a brake for descending loads. The exhibit also displayed prominently samples of the large line of Service casters, including the unbreakable ForgeWeld model, rated at 4,000 pounds per single unit. Floor-saving wheels of special Textolite fabrication were also a part of the presentation. The Service Hydraulic Lift Truck, recently developed, was the last of the items on display. It is one of the first units to supplant the old style mechanical type. Several hundred catalogs and descriptive pieces were distributed from the booth during the three-day period. Officials of the company present at the Service booth were W. C. Peak, secretary and general manager, and S. S. Raynor, sales manager . . . both of Albion . . . and N. Warshaw, president, The Service Caster and Truck Company of New England, and L. L. Reed, eastern sales manager and treasurer of the company.

Sturtevant Mill Co.

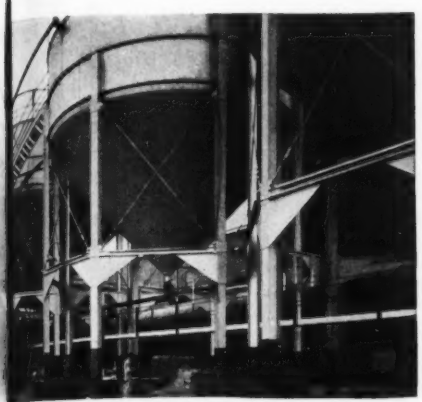
The Sturtevant Mill Company, Park and Clayton streets, Dorchester, Mass., showed some of the products of this company. There was a full sized Poirier Control mounted on a special stuff box, used with it. In addition, the operation of a Poirier Control was illustrated by an illuminated "Scene-in-Action" picture, showing the movement of stock through the box and control, and the movement of the dilution water. Thus it was possible not only to see the actual control, but visualize the operation of the control in much better manner than by photographs or blue-prints. Another device displayed was the ingenious Poirier Vacuum Multiple Header, or Drop Leg, for use on suction boxes, or other equipment requiring a reasonable suction. This Drop Leg is self priming, using either water or air, and its use reduces the amount of power required for pumps. Due to the fact that the major product of this company, the Sturtevant Bale Pulper, is too large a piece of equipment to display, photographs of this machine were resorted to, for those interested. The exhibit was in charge of W. T. Doyle, assisted by Ernest Poirier and Otto Goeppinger, special sales representatives.

Taylor Instrument Companies

The Taylor Instrument Companies, Rochester, N. Y., displayed the entire line of Taylor instruments for the pulp and paper industry against a colorful background. The instruments which were featured were the Taylor pulp grinder temperature control unit, the Taylor beater roll pressure recorder, the Taylor press roll load recorder and the Taylor supercalender load indicator. Also shown were the Taylor time schedule controller, the Taylor indicating fulscope temperature controller, the Taylor recording temperature controller, the Taylor dial thermometer and the Taylor self-acting temperature controller. Much interest was expressed by visitors at the show in the various Taylor instruments which used a new type of load and tension recording element. Many interesting applications were demonstrated. The Taylor exhibit was in charge of C. D. DeMers, from the Rochester plant of Taylor Instrument Companies. Others attending were J. E. Hart, Rochester; A. H. Allen, managing director of Taylor Instrument Com-

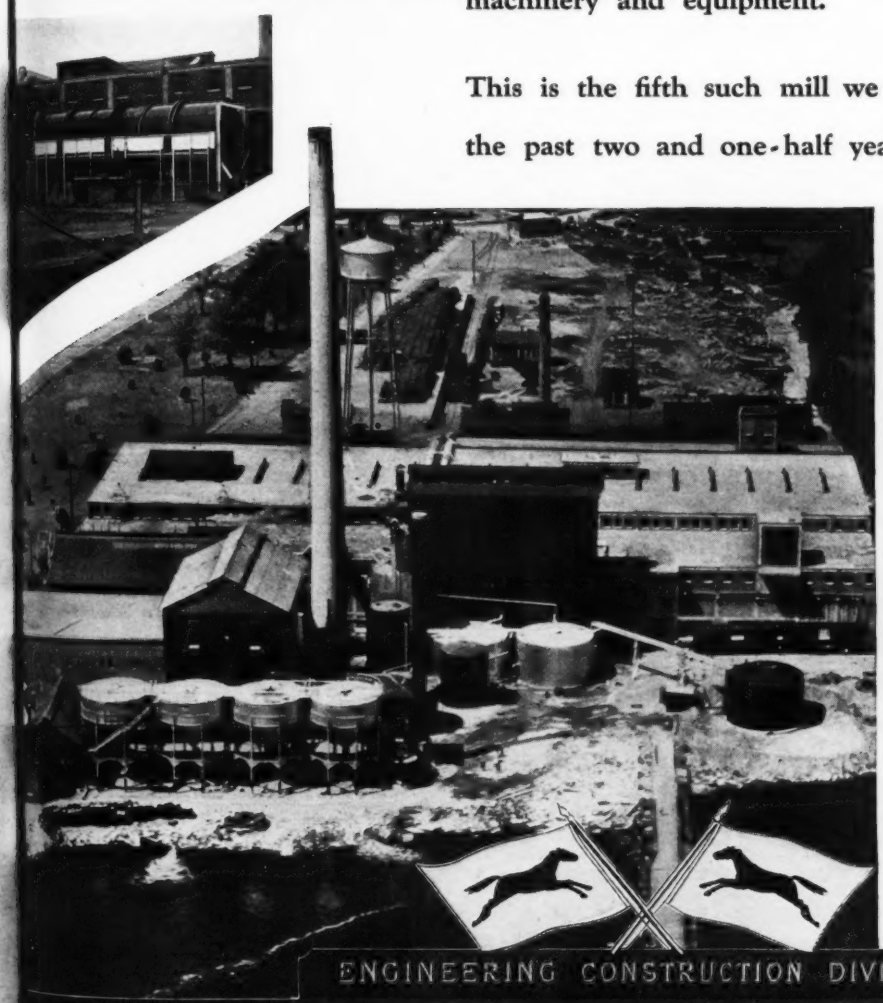
Another Record Accomplishment

SEVEN months to the day after the National Container Corporation completely turned over the site to us to build a 200-tons-daily capacity pulp and paper board mill at Jacksonville, Florida, satisfactory paper was rolling up on the reel at the finish end—twenty-eight minutes after pulp was delivered to the paper machine. The first run (more than five hours) was completed without a break.



This mill was built in its entirety by the Engineering Construction Division of Merritt-Chapman & Scott Corporation from foundations to the complete installation of the producing machinery and equipment.

This is the fifth such mill we have built in the South in the past two and one-half years. Together, they constitute a succession of records for speed, economy and satisfaction to the owners.



Airview of completed pulp mill of National Container Corp., Jacksonville, Fla. Small illustrations show special equipment.

ENGINEERING CONSTRUCTION DIVISION

MERRITT-CHAPMAN & SCOTT CORPORATION

The Pacific Coast Depe

FROM CANADA to MEXICO.

Serves the Growing Pacific Coast Pulp and

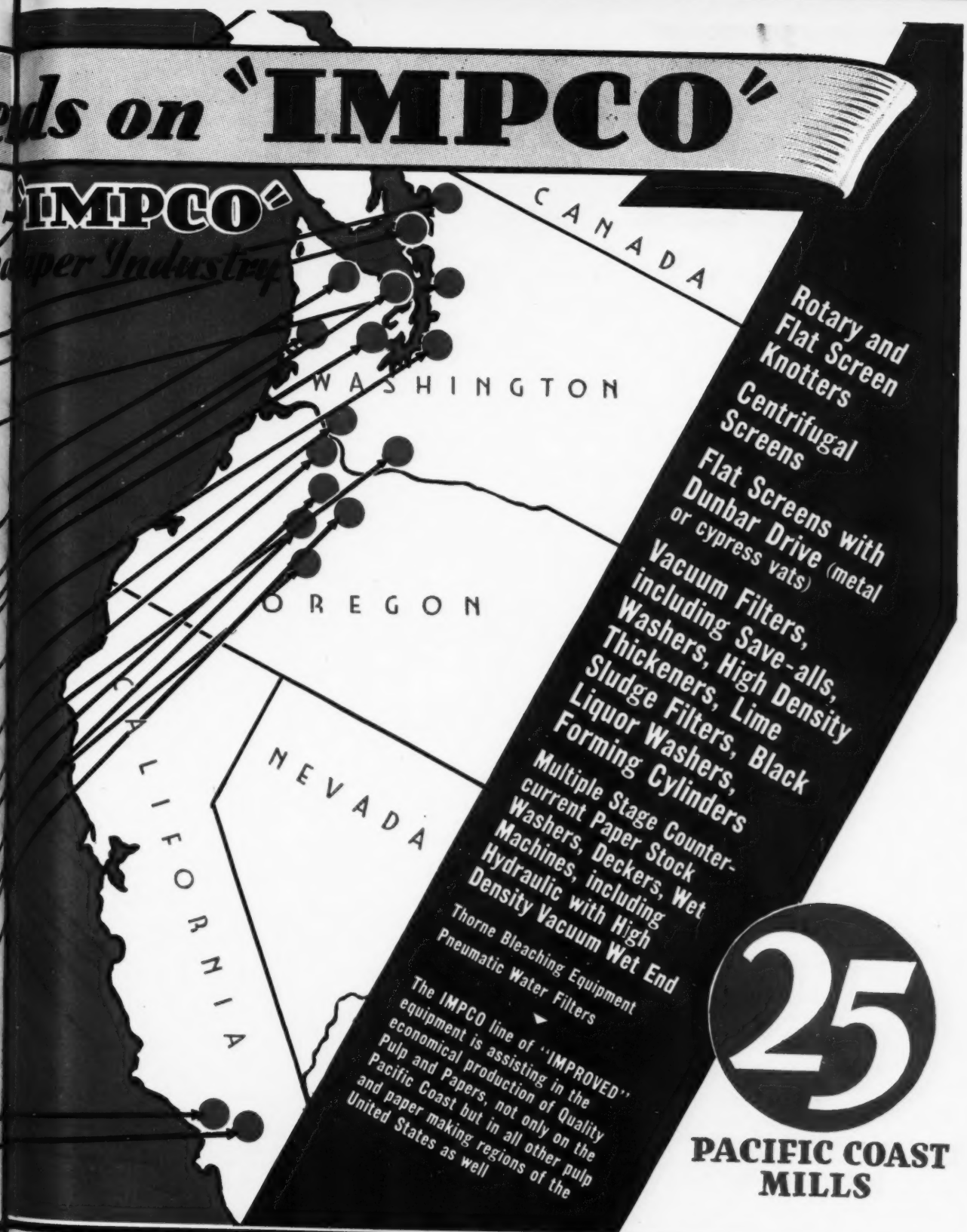
Pacific Mills, Limited	OCEAN FALLS, B. C.
Puget Sound Pulp & Timber Co.	BELLINGHAM
Puget Sound Pulp & Timber Co.	ANACORTES
Everett Pulp & Paper Co.	EVERETT
Soundview Pulp Company	EVERETT
Weyerhaeuser Timber Co.	EVERETT
Fibreboard Products, Inc.	PORT ANGELES
Rayonier Incorporated	PORT ANGELES
Washington Pulp & Paper Co.	PORT ANGELES
National Paper Products Co.	PORT TOWNSEND
Rayonier Incorporated	HOQUIAM
Rayonier Incorporated	SHELTON
Everett Pulp & Paper Co.	TACOMA
Rayonier Incorporated	TACOMA
St. Regis Kraft Company	TACOMA
Longview Fibre Company	LONGVIEW
Fir-Tex Insulating Board Co.	ST. HELENS
St. Helens Pulp & Paper Co.	ST. HELENS
Crown Willamette Paper Co.	CAMAS
Crown Willamette Paper Co.	WEST LINN
Crown Willamette Paper Co.	LEBANON
Hawley Pulp & Paper Co.	OREGON CITY
Oregon Pulp & Paper Co.	SALEM
Fibreboard Products, Inc.	LOS ANGELES
California Fruit Wrapping Mills	POMONA

IMPROVED PAPER

NASHUA, N

...eeds on "IMPCO"

...O, "IMPCO"
...and Paper Industry
...C.



Rotary and Flat Screen Knotters

Centrifugal Screens

Flat Screens with Dunbar Drive (metal or cypress vats)

Vacuum Filters, including Save-alls, Washers, High Density Thickeners, Lime Sludge Filters, Black Liquor Washers, Forming Cylinders

Multiple Stage Counter-current Paper Stock Washers, Deckers, Wet Machines, including Hydraulic with High Density Vacuum Wet End

Thorne Bleaching Equipment

Pneumatic Water Filters

The IMPCO line of "IMPROVED" equipment is assisting in the economical production of Quality Pulp and Papers, not only on the Pacific Coast but in all other pulp and paper making regions of the United States as well

25

PACIFIC COAST MILLS

...R MACHINERY CORPORATION

...NEW HAMPSHIRE

panies, Ltd. of Canada; F. T. Armour, Fred Hummell and Geo. Lint of the Toronto factory.

Testing Machines, Inc.

Testing Machines, Inc., New York, displayed the Canadian Standard Beating and Freeness Tester, a product of the Robert Mitchell Company; the Schopper Standard Folding Endurance Tester; Schopper Standard Micrometers; Schopper Bending Fatigue Tester for papers, boards, cellophane, etc.; and paper scales. Literature concerning all equipment was on hand, and details about the Johnston Fibre Classifier were given.

U.P.M.-Kidder Press Co.

U.P.M.—Kidder Press Company, Inc., of Dover, N. H., showed its Super-speed Slitters and Roll Winders. Its booth was attractively decorated in turquoise blue colored paper with black and white trimmings.

While one of the earliest manufacturers of slitting equipment and mill winders, of late the printing press building end of its business has been somewhat more prominent, although many mill men are familiar with its equipment. Several slit rolls of paper were shown indicating its high speed machines are built to handle almost any kind of paper or board, and the arrangement shown of its spring mounted top cutters on the quickly adjustable bottom cutter assures a clean dustless shear cut and the company claims these cutters are self-sharpening, and will operate a year or more without attention. Prominent in the background were enlarged photographs of recently built machines showing rigidity and massiveness which gives the balance the firm claims is so necessary for rewinding at high speeds. G. E. Holmes, chief engineer from Dover, N. H., and W. C. Glass, New York manager, were in charge of the exhibit.

Wallace & Tiernan Co., Inc.

Wallace & Tiernan Company, Inc., of Newark, N. J., and Wallace & Tiernan, Ltd. of Toronto, Ont., jointly exhibited their equipment used in the pulp and paper mills for slime control treatment. The exhibit featured the W. & T. Visible Vacuum Chlorinator Type MSVM, and the W. & T. Type MDPAM Ammoniator, used in combination for chloramine treatment. Technical literature was available at the booth describing the cause and effect of slime growth in the mills.

Warren Steam Pumps Co., Inc.

Warren Steam Pump Company, manufacturer of pumping machinery, Warren, Mass., used its space as a meeting place where its representatives could meet their friends and acquaintances. Literature on pumps for paper mill service was available at the booth.

Whirlflex Sales, Inc.

Whirlflex Sales, Inc., Buffalo, N. Y., demonstrated the method of cleaning 5 inch to 14 inch pipe by the Whirlflex mechanical pipe cleaner, which consists of a revolving wire brush mounted on a head to which is attached a pilot for guiding cleaner through pipe. Also on display were flexible brushes for open surface planing. Gerald Robinson, Mrs. K. V. Deem and S. Nelson Mann were in attendance.

Bidding for Business in Washington

New rules and regulations result in a poetic outburst by Joseph L. Fearing, entitled "Yes, I don't need mucha business!"

Joseph L. Fearing, formerly a member of the executive committee of the Book Paper Manufacturer's Association, occasionally attends meetings of the association, and almost always has something serious or humorous to say. Last week, on being called upon for a speech at an informal gathering at the Hotel Waldorf in New York, Mr. Fearing explained that he had received from the American Paper and Pulp Association a letter written by their counsel, telling the numerous new rules, regulations and restrictions that have recently been put into effect, which must be followed and obeyed by anyone wishing to bid successfully on business with any branch of the Federal Government in Washington, D. C. In an attempt to clarify the situation Mr. Fearing asked a good many questions. Receiving answers, he stated that he was "still much puzzled, if not uneasy." "I was sure," said Mr. Fearing, "that the new rules could not be made plain in prose, so I decided to clarify them in a poem, which I feel sure will upset everybody." Then, amid much laughter, Mr. Fearing read the following verses, entitled "Yes, I don't need mucha business!"

YES, I DON'T NEED MUCHA BUSINESS!

Three Owls called Wise, Whitney and Canfield
In a letter that's dated June three
Tell why it's not nice to do business
In Washington City—D. C.

They tell me I'm subject to Taxes
A license must get from F. D.
If I would keep out of the Hoosegow
At Washington City—D. C.

They urge me to *mail* my proposal
Or Wigwag from far out at Sea
To relieve me from taxes and License
Of Washington City—D. C.

If ever I land a damned order
They warn me most watchful to be
That the *mill* sends my formal acceptance
To Washington City—D. C.

They say I should ship by a steamboat
That I'm stung if I ship C. O. D.
That my bus is not legal delivery
In Washington City—D. C.

They observe that a Washington merchant
Should climb up a Baltimore tree
And fly his proposals by pigeon
To Washington City—D. C.

These Wise Byrds, called Whitney and Porker
Have got me balled up—don't you see?
Yes, I guess I don't need mucha business,
In Washington City—D. C.

Paper Makers' Rosin Size

The Southern Naval Stores Company is manufacturing the paper makers' rosin size from the highest quality FF wood rosin to meet the specification requirements of purchasers.

The Southern Naval Stores Company is a large manufacturer of steam distilled wood rosin, turpentine and pine oil, with a plant at Columbia, Miss.

- ★ ROSIN SIZE
- ★ SATIN WHITE
- ★ PARAFFIN EMULSIONS
- ★ CASEIN
- ★ CASEIN SOLVENTS
- ★ SULPHONATED OILS
- ★ PINE OILS
- ★ ANTI-FROTH OIL
- ★ WAX SIZES

SUPERIOR PMC CHEMICALS

Superior Chemicals for Paper Makers

Paper Makers Chemical Division

HERCULES POWDER COMPANY
Incorporated
Kalamazoo, Michigan

BRANCH OFFICES:

Stoneham, Mass.
Holyoke, Mass.
Providence, R. I.
Albany, N. Y.
Carthage, N. Y.
Lockport, N. Y.
Easton, Pa.
Wilmington, Del.
Atlanta, Ga.
Savannah, Ga.
Jacksonville, Fla.
Pensacola, Fla.
Marrero, La.
Kalamazoo, Mich.
Milwaukee, Wis.
Chicago, Ill.
Portland, Ore.
San Francisco, Calif.
Freeman, Ont.
Erith, England

PM-56

Those Who Attended The Convention

Official Registration of the American Pulp and Paper Mill Superintendents Association

A

Mr. and Mrs. P. J. Abel, Stickle Steam Specialities Co., Indianapolis, Ind.
Ahlen, Tore, Paper Machinery Ltd. (Svenska Flaktfabriken), Montreal, Que.
Mr. and Mrs. W. H. Aird, Howard Smith Paper Mills, Ltd., Toronto, Ont.
Mr. and Mrs. Niles M. Anderson, St. Regis Kraft Co., Tacoma, Wash.
Samuel I. Anderson, Hooker Electro-Chemical Co., New York, N. Y.
F. D. Armour, Taylor Instrument Companies, Toronto, Ont.
Mr. and Mrs. R. M. Armstrong, Howard Smith Paper Mills, Cornwall, Ont.
Dr. C. G. Albert, Edgar Bros. Co., Metuchen, N. J.
James J. Andrews, Fox Paper Co., Lockland, Ohio.
F. F. Arnoldi, Hinde-Dauch Paper Co., Toronto, Ont.

B

Mr. and Mrs. C. L. Bachelder, Hercules Powder Co., Kalamazoo, Mich.
E. H. Barnes, Michigan Carton Co., Battle Creek, Mich.
Mr. and Mrs. Emmett Barney, Cornell Wood Products, Cornell, Wis.
T. M. Barry, Fraser Paper Ltd., Madawaska, Maine.
C. S. Barton, Rice, Barton, & Fales, Worcester, Mass.
T. G. Batchelor, Hercules Powder Co. Inc., Wilmington, Dela.
Chas. L. Bauer, Bauer Bros. Co., Springfield, Ohio.
H. Thos., Baughman, West Virginia Pulp & Paper Co., Williamsburg, Pa.
J. Baxter, Shartle Bros. Machine Co., Middletown.
D. E. Bailey, Pres., Bailey & Blendinger Co. Inc., Union, N. H.
Mr. and Mrs. B. Beasley, Brown Paper Mill Co., New York City.
Mr. and Mrs. B. Beasley, Brown Paper Co., Monroe, La.
T. H. Beaune, Fibre Board Products Inc., Port Angeles, Wash.
Mr. and Mrs. Gene Bechard, Pulp & Paper Mill Accessories, Atlanta, Ga.
J. B. Beck, E. B. Eddy Co., Hull, Que.
F. K. Becker, Bird Machine Co., South Walpole, Mass.
William Beckett, The Beckett Paper Co., Hamilton, Ont.
E. B. Beede, Foxboro Co., Chicago, Ill.
Mr. and Mrs. L. C. H. Beighey, Hammermill Paper Co., Erie, Penn.
M. H. Bennett, Stebbins Engineering & Mfg. Co., Watertown.
Mr. and Mrs. H. F. Bennett, Gardner & Richardson Co., Middletown, Ohio.
Bernard Benson, Williams Gray Co., Chicago, Ill.
George L. Bidwell, Riegel Paper Corp., Riegelsville, Pa.
Mr. and Mrs. L. H. Bidwell, Riegel Paper Corp., Reigelsville, N. J.
H. F. Bigelow, Weyerhaeuser Timber Co., Clinton.
Mr. and Mrs. J. E. Blosser, Veldown Co., Glens Falls, N. Y.
Howard W. Bogle, Central Fibre Products Co., Vincennes, Ind.
R. G. Bohn, Michigan Carton Co., Battle Creek, Mich.
L. M. Booth, Booth Chemical Co., Elizabeth, N. J.
Mr. and Mrs. W. G. Booth, Robert Gair Co., Haverhill, Mass.
F. C. Boyce, Wisconsin Paper & Products, Milwaukee, Wis.
W. G. Bradbury, Bradbury Steel Co. Ltd., Toronto, Ont.
Herbert A. Brawn, Howard Smith Paper Mills, Ltd., Beauharnois, Que.
S. M. Bretton, Pusey & Jones Co., Wilmington, Del.
Mr. and Mrs. L. H. Breyfogle, Draper Bros. Co., Canton, Mass.
Mr. and Mrs. S. T. Brian, Paper Makers Importing Co., Easton, Pa.
Mr. and Mrs. Ralph E. Briggs, Draper Brothers Co., Canton, Mass.
Mr. and Mrs. Arthur Brosius, Brown Co., Berlin, N. H.
A. E. Broughton, A. E. Broughton & Co., Glen Falls.
A. A. Brown, Kenwood Mills, Ltd., Arnprior, Ont.
Mr. and Mrs. J. S. Brown, Abitibi Power & Paper Co., Iroquois Falls, Ont.
E. S. Brown, Crane Ltd., Toronto, Ont.
Spencer Brown, Rhinelander Paper Co., Rhinelander.
Mr. and Mrs. W. E. Brown, American Wringer Co., Woonsocket, R. I.
John Browne, Chemical Paper Co., Holyoke, Mass.
Betty Brydges, Big Island, Va.
Mr. and Mrs. Wm. H. Brydges, Bedford Pulp & Paper, Big Island, Va.
Richard Brydges, Big Island, Va.
E. J. Buell, Niagara Wire Weaving Co., Niagara Falls, Ont.
Miss Geraldine Burke, Boston, Mass.
J. Burke, Thunder Bay Paper Co., Port Arthur, Ont.
Mr. and Mrs. J. J. Burke, Bird & Son Inc., East Walpole.
B. R. Burland, Canada Pumps Ltd., Montreal, Que.
H. C. Burnett, New Haven Pulp & Board Co., New Haven, Conn.
R. S. Burr, American Brass Co., Waterbury, Conn.
Mr. and Mrs. H. H. Burrows, Manhattan Rubber Co., Passaic, N. J.
J. Buss, Provincial Paper, Ltd., Toronto, Ont.
DeHaven Butterworth, H. W. Butterworth & Sons Co., Philadelphia, Pa.
T. E. Buton, Fort Orange Paper Co., Castleton-On-Hudson, N. Y.
W. E. Bailey, Dilts Machine Works, Fulton, N. Y.
Horace R. Baker, Harris-Seybold-Potter Co., Cleveland, Ohio.
Henry P. Baldwin, Consolidated Water Power & Paper Co., Wisconsin Rapids.
Mr. and Mrs. P. J. Ball, Endicott Johnson Corp., Johnson City, N. J.
W. S. Barber, Provincial Paper Ltd., Toronto, Ont.
R. G. Betts, W. & L. E. Gurley (Hughes Owens Co.), Troy, N. Y.
J. M. Booth, The Huron Milling Co., New York City, N. Y.
W. G. Bowness, Nichols Engineering & Research Corp., Canada, Ltd., Montreal, P. Q.
B. M. Briggs, Lawrence Paper Co., Lawrence, Kansas.
Mr. and Mrs. H. L. Buckner Process Co., Worcester, Mass.
J. G. Bullard, Corn Products Refining Co., New York City, N. Y.
W. H. Burbidge, Canadian Allis Chalmers, Toronto, Ont.

C

Arthur E. Cabble, William Cabble Wire Mfg. Co., Brooklyn, N. Y.
Wm. N. Cairnie, E. B. Eddy Co., Hull, Que.
John G. Calan, Jr., Foxboro Co., Foxboro, Mass.
Geo. L. Cameron, Abitibi Power & Paper Co., Iroquois Falls, Ont.
E. W. Camp, National Aniline & Chemical Co., Toronto, Ont.
Wm. H. Cape, S. D. Warren Co., Cumberland Mills, Me.
G. N. Carleton, Detroit Sulphite Pulp & Paper Co., Detroit, Mich.
C. M. Carmichael, Shawinigan Chemical Ltd., Montreal, Que.
G. Carruthers, Interlake Tissue Mills Co., Toronto, Ont.
V. B. Case, Paper Makers Importing, Easton, Pa.
Mr. and Mrs. Charles Champion, Millers Falls Paper Co., Millers Falls, Mass.
C. H. Champion, R. T. Vanderbilt Co., New York, N. Y.
Miss Frances Champion, Millers Falls, Mass.
D. B. Chant, Ontario Pulp & Paper Association, Toronto, Ont.
Mr. and Mrs. H. S. Chellis, Brown Co., Portland, Me.
J. D. Chisholm, Bepco Canada Ltd., Montreal, Que.
L. A. Chown, Ayers Ltd., Lachute Mills, Que.
Chas. H. Clapham, Elec. Tachometer Corp., Philadelphia, Pa.
A. B. Clark, Ross Engineering, New York City.
C. L. Clark, Nash Engineering Co., New York City.
Edwin W. Clark, E. C. Atkins & Co., Indianapolis, Ind.
A. C. Clarke, John W. Bolton & Sons, Inc., Lawrence, Mass.
J. B. Clarke, National Aniline Chemical Co., Chicago, Ill.
K. H. J. Clarke, International Nickel Co. of Canada, Toronto, Ont.
P. W. Codwise, Beaverwood Fibre Co., Thorold, Ont.
Cooke-Broomfield, Mrs. Isabel, Toronto, Ont.
Mr. and Mrs. R. M. Cook, Hinde & Dauch Paper Co., Toronto, Ont.
Mr. and Mrs. A. W. Cole, Rex Paper Co., Kalamazoo, Mich.
Mr. and Mrs. C. M. Connor, Valley Forge Laboratory, Conshohocken, Pa.
O. C. Cordes, Dowingtown Mfg. Co., Downington, Pa.
John Cornell, *The Paper Mill*, New York City.
Geo. E. Corson, Clinton Co., Clinton, Iowa.
A. C. Cosler, Bauer Brothers Co., Springfield, Ohio.
H. Cox, B. F. Goodrich Rubber Co., Montreal, Que.
Mr. and Mrs. G. W. Craigie, Convention Manager, Cumberland Mills, Me.
K. S. Crawford, Union Screen Plate Co., Lennoxville, Que.
Mr. and Mrs. Lester W. Crouse, Penick & Ford Ltd., New York City.
Mr. and Mrs. Bryant Currier, W. S. Tyler Co., Cleveland, Ohio.
Mr. and Mrs. W. W. Campbell, Jr., Lockport Felt Co., Lockport, N. Y.
C. C. Cariss, Waterous Ltd. (Shartle Bros.) Brantford, Ont.
J. E. Carruthers, Interlake Tissue Mills, Merritton, Ont.
Mrs. D. B. Chant, Toronto, Ont.
Arthur A. Coffin, Titanium Pigment Corp., New York, N. Y.
F. H. Cole, Walworth Co., New York City, N. Y.
Mr. and Mrs. W. A. Collins, Stillwater Tissue Mills Inc., Stillwater, N. Y.
Mr. and Mrs. J. W. Costello, Tonawanda Boxboard Co., Tonawanda, N. Y.
E. Cowles, Cowles Co., Princton, N. J.
W. A. Crawford, Toronto, Ont.
Mrs. B. G. Cross, Toronto, Ont.

D

J. A. Dickinson, Crane Ltd., Montreal, Que.
Mr. and Mrs. J. D. Dickson, R. T. Vanderbilt Co., New York, N. Y.
Mr. and Mrs. Frederick A. Dieckbrader, Toronto, Ont.
J. C. Dieffenderfer, Hercules Powder Co. Inc., Wilmington, Delaware.
G. Docherty, Holyoke Wire Cloth Co., Holyoke, Mass.
W. R. Dorken, B. F. Goodrich Co., Kitchener, Ont.
F. F. Dority, G. R. Booth Limited, Ottawa, Ont.
Mr. and Mrs. P. F. J. Dolan, Alliance Paper Mills Ltd., Merritton, Ont.
D. Douglass, B. F. Goodrich Company, Kitchener, Ont.
Jos. H. Dow, Castle & Overton, Inc., New York City, N. Y.
Mr. and Mrs. Wm. T. Doyle, Sturtevant Mill Co., Boston, Mass.
Mr. and Mrs. Lewis Dozier, Rhinelander Paper Co., Rhinelander, Wis.
Mr. and Mrs. Arthur B. C. Drew, Pairpoint Corp., New Bedford, Mass.
Mr. A. G. Daugherty, Simonds Worden White Co., Dayton, Ohio.
H. D. Davidson, Welland Electric Steel Foundry, Welland, Ont.
M. W. Davis, Sherbrooke Machineries Ltd., Montreal, Que.
G. K. Dickerman, Consolidated Water Power & Paper Co., Wisconsin Rapids.
E. L. Dilworth, Canada Pumps Ltd., Kitchener.
P. A. Donaghy, Corn Products Sales, South Boston, Mass.
F. G. Durkee, F. G. Durkee Co., Syracuse, N. Y.
C. O. Duston, Stowe Woodward Inc., Newton Upper Falls, Mass.
P. E. Daley, Eastwood Nealley Corp., Belleville, N. J.
F. J. Deegan, Ciba Co., Montreal, Que.
Mrs. K. V. Deem, Whirlflex Sales Inc., Buffalo, N. Y.
C. D. DeMars, Taylor & Smith Co., Rochester, N. Y.
Mr. and Mrs. V. S. Denison, Beloit Iron Works, Beloit, Wis.
Miss Ruth Denison, Beloit, Wis.
David DeZurik, DeZurik Shower Co., Sartell, Minn.
Mr. and Mrs. D. R. Dick, Howard Smith Paper Co., Cornwall, Ont.
H. M. Dickson, G. T. McAvity & Sons Ltd., St. John.
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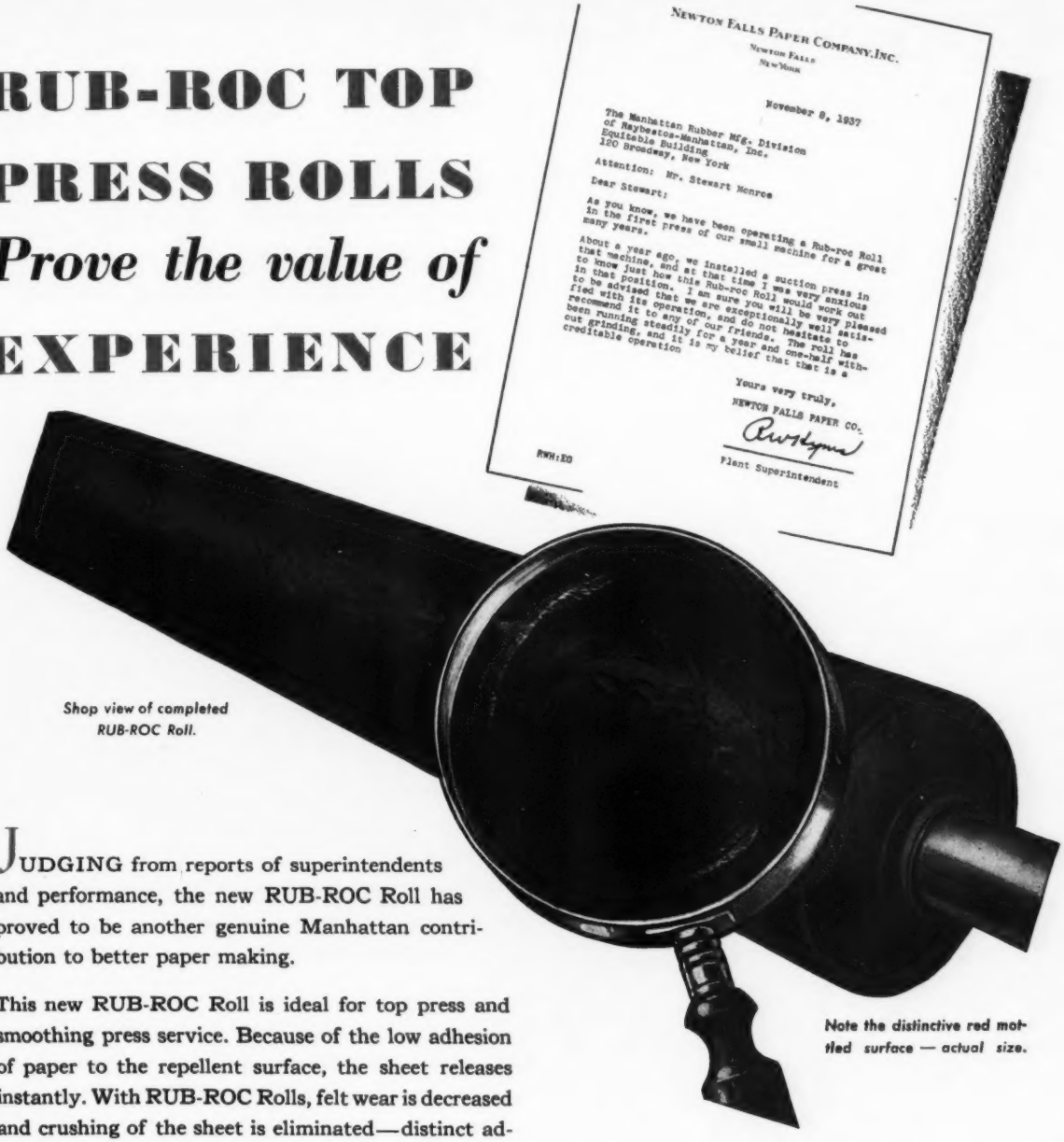
E

D. W. Eamer, Rolland Paper Co., Mont-Rolland, Que.

RUB-ROC TOP PRESS ROLLS *Prove the value of* EXPERIENCE


NEWTON FALLS PAPER COMPANY, INC.
NEWTON FALLS
NEW YORK
November 8, 1937
The Manhattan Rubber Mfg. Division
of Raybestos-Manhattan, Inc.
Equitable Building
120 Broadway, New York
Attention: Mr. Stewart Monroe
Dear Stewart:
As you know, we have been operating a Rub-roc Roll in the first press of our small machine for a great many years.
About a year ago, we installed a suction press in that machine, and at that time I was very anxious to know just how this Rub-roc Roll would work out in that position. I am sure you will be very pleased to be advised that we are exceptionally well satisfied with its operation, and do not hesitate to recommend it to any of our friends. The roll has been running steadily for a year and one-half without grinding, and it is my belief that that is a creditable operation
Yours very truly,
NEWTON FALLS PAPER CO.
RWH:EO
Plant Superintendent

Shop view of completed RUB-ROC Roll.

Note the distinctive red mottled surface — actual size.

JUDGING from reports of superintendents and performance, the new RUB-ROC Roll has proved to be another genuine Manhattan contribution to better paper making.

This new RUB-ROC Roll is ideal for top press and smoothing press service. Because of the low adhesion of paper to the repellent surface, the sheet releases instantly. With RUB-ROC Rolls, felt wear is decreased and crushing of the sheet is eliminated—distinct advantages over rolls made of granite, gun-metal or wood.

RUB-ROC Rolls may be identified by their distinctive mottled surface. They are guaranteed not to pick-up or crack in service.

Why not try a RUB-ROC Roll on your next installation and let it prove its value from the standpoint of uniformity of quality and increased production? Write for further information.

Manhattan Rolls also made at Fox River Valley Factory, Neenah, Wisconsin, and at North Charleston, South Carolina.

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L

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To Mill Operators Seeking ADJUSTABLE Speed A-C Drives

For a wide range of speeds, investigate the BTA motor

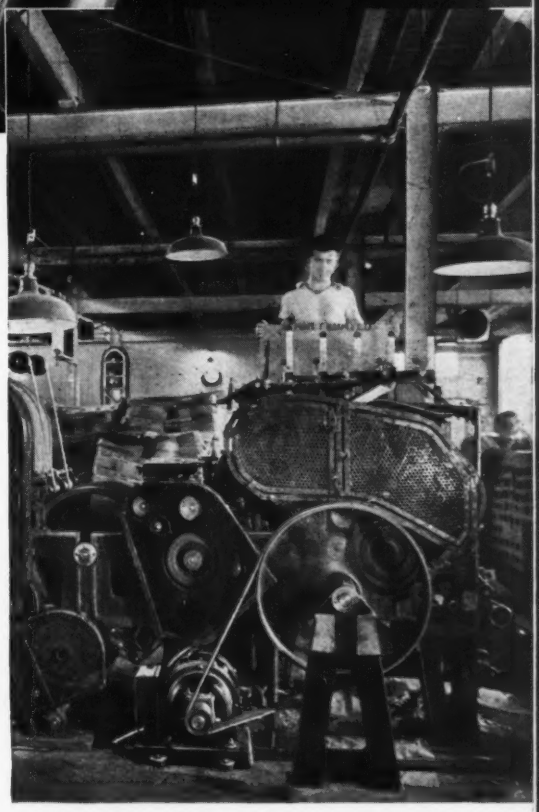
WHERE you want a variety of speed changes without installing d-c drives, gear-train arrangements, or belt-changing devices, the answer may well be one of General Electric's Type BTA motors.

For example: At the Hammond Bag & Paper Co. plant a BTA motor replaced a constant-speed-motor drive on the speed of which the grade of paper produced depended. Since it was installed, the BTA motor, with its wide and easily adjusted speed range, has helped improve not only the grade, but also the tear and tensile strength, of the paper.

Especially applicable to various processes in the paper industry, this motor has great mechanical and electrical stability. It is not difficult to install.

By reason of its design and construction, it costs more than a general-purpose motor. But it has well repaid the investment in numerous installations.

For information on the application of a BTA motor in your mill, inquire of the nearest G-E office or write to General Electric Company, Dept. 6—201, Schenectady, New York.



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Q

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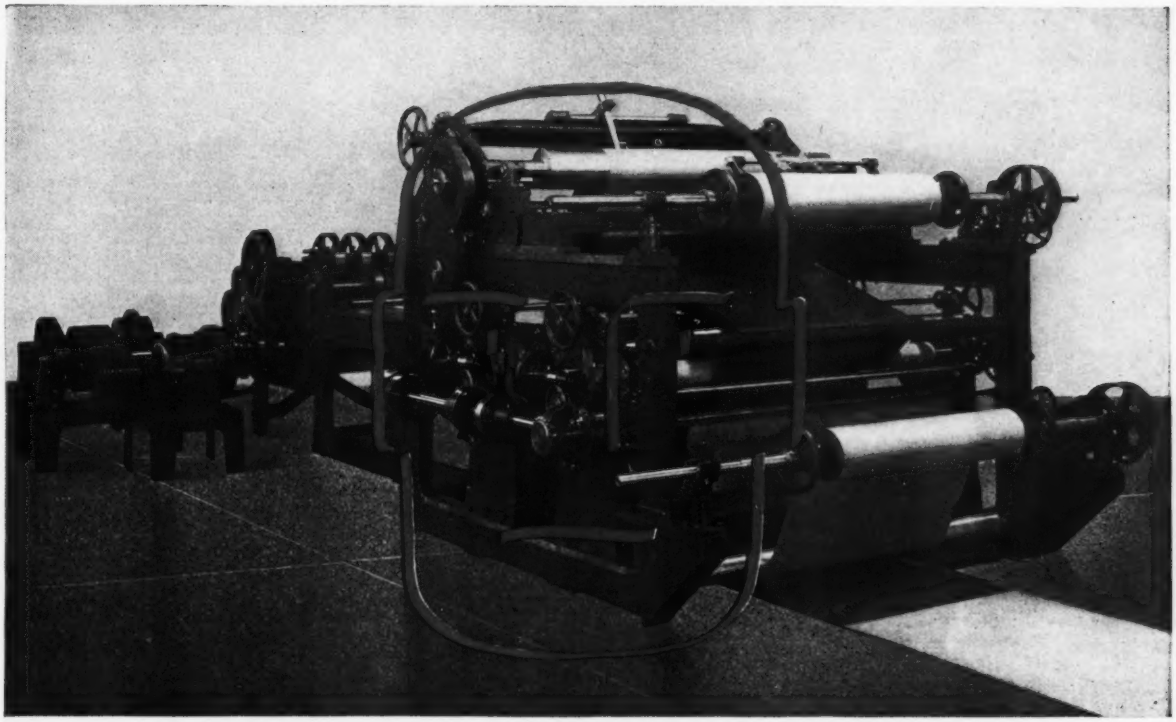
Mr. and Mrs. Albert G. Rozyskie, Southern Kraft Corp., Mobile, Ala.
Mrs. G. R. Rausch, St. Catharines, Ont.
C. P. Reaper, Can. Ingersoll-Rand, Montreal, Que.
Douglas Robbins, Douglas Robbins & Co., Middletown, Ohio.
Geo. Roschek, Kingsey Falls, P. Q.

S

F. M. Sanger, Bagley & Sewall Co., Watertown, N. Y.
A. G. Sawyer, Rollway Bearing Co. Inc., Syracuse, N. Y.
C. B. Sawyer, Rollway Bearing Co. Inc., Syracuse, N. Y.
H. F. Schenk, Wm. A. Hardy & Sons Co., Fichburg.
J. Scheuerman, Cameron Machine Co., Brooklyn, N. Y.
Mr. and Mrs. J. Carl Schmidt, Du Pont Co., Wilmington, Del.
John Schuber, Solvay Process Co., Syracuse, N. Y.
Mr. and Mrs. Norman B. Scott, Orr Felt & Blanket Co., Piqua, Ohio.
D. M. Shapleigh, Hercules Powder Co., Albany.
C. M. Shipway, Wm. E. Hooper & Sons Co., Philadelphia.
A. C. Shively, Harris Seybold Potter Co., Dayton, Ohio.
F. L. Shonkwiler, Peacock Bros., Limited, Montreal, Que.
Mr. and Mrs. W. C. Slattery, Sinclair Co., Middletown.
Mr. and Mrs. Arthur C. Smith, Racquette River Paper Co., Potsdam, N. Y.
Mildred Smith, A. E. Broughton Co., Glens Falls.
F. A. Soderberg, General Dyestuff Corp., New York City.
Claude L. Spafford, Sherbrooke Machineries Limited, Sherbrooke, Que.
Horace Spencer, Porritts & Spencer Ltd., Bury, England.
Mr. and Mrs. D. S. Stacy, Grand Rapids, Mich.
S. A. Staege, Black-Clawson Company, Hamilton, Ohio.
S. B. Stafford, Rice, Barton & Fales, Inc., Worcester, Mass.
Mr. and Mrs. Oscar Stamets, Regal Paper Corp., Milford, N. J.
E. L. Stansel, Provincial Paper Ltd., Mille Roches.
Mr. and Mrs. A. H. Stanton, Mason-Neilen Regulator Co., Boston, Mass.
Mr. and Mrs. Cornelius Stapley, Chemical Paper Co., Holyoke.
F. L. Stapley, Crocker-McElwain Co., Holyoke.
Miss Muriel Stapley, Holyoke, Mass.
Mr. and Mrs. Stephen Stapley, Provincial Paper Co., Thorold.
L. Starck, H. & T. McCluskey & Sons Inc., New Haven, Conn.
J. N. Stephenson, *Pulp & Paper Magazine of Canada*, Gardenvale, Que.
Robt. B. Stewart, Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.



It *Thinks* . . .

Smith & Winchester engineers adapted the photo-electric cell (electric eye) to S & W's improved straight line Paper Bag Tuber. Result: seam variations are held to 1/16″ plus or minus, regardless of unevenly wound or badly dished rolls.

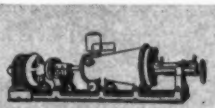
From previously printed rolls the printing variations are held to 1/8″.

And the speed is 600 feet a minute, or more.

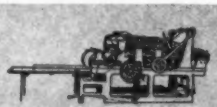
Without increasing the number of machines you have in use, or your space, *or* your man power—you can make production leap ahead by replacing present machines with this new development.

Complete data and quotations on S & W Paper Bag Tubers and Bottomers will be sent to you without obligation. Have your secretary drop us a note asking for it.

SIDE REGISTER CONTROL Photo-electric eye keeps paper edge in straight line from uneven rolls. Adaptable to bag machines, printing presses, coating machines, etc.



JORDANS 4 standard sizes handle 3 to 45 tons per 24 hours. Steel caps eliminate shrunk-on bands. Dovetailed knives in cone. Bulletin?



BOTTOMERS For all sizes of satchel or valve bottom paper bags, single or multi-wall. Write for bulletin.

ROTARY CUTTERS For cutting printed matter with compensator for registering. Write for information.

UNDERCUT TRIMMERS On finest grades — to boards. Cutting edge is *up*, not down. Dual Control — both hands below table. Sizes: 43″ to 92″ wide. Write for yellow bulletin.

Also write for information on Fourdriniers; cylinder and wet machines; slitters and calenders; reels and winders; glazers; stuff pumps; shower pipes.

The SMITH & WINCHESTER *Manufacturing Company*

ONE HUNDRED AND TEN YEARS OF ADVANCEMENT

PLANT AND OFFICES AT SOUTH WINDHAM, CONN.

R. C. Stewart, Shartle Bros. Machine Co., Middletown, Ohio.
E. L. Stilson, Bristol Co., Waterbury, Conn.
Frank F. Stoughton, Spruce Falls Power & Paper Co., Kapuskasing, Ont.
H. Drew Stroup, West Virginia Pulp & Paper Co., Williamsburg, Pa.
P. B. Stull, Hercules Powder Co., Wilmington, Del.
Miss Anne Sullivan, Boston, Mass.
Douglas G. Sutherland, Sutherland Refiner Ltd., Montreal, Que.
Glen Sutton, Sutherland Paper, Kalamazoo.
H. M. Sutton, Bagley & Sewall Co., Watertown, N. Y.
A. M. Schmalz Thilmany Pulp & Paper Co., Kaukauna, Wis.
H. S. Schniewind, Testing Machines, Inc., New York City.
C. E. Simons, Brompton Pulp & Paper Co., East Angus.
Mr. and Mrs. R. G. Sloat, Hinde & Dauch Paper Co., Sandusky, Ohio.
B. P. Steele, Pennsylvania Salt Mfg. Co., Philadelphia.
J. P. Strasser, Stein Hall & Co., New York City.
R. L. Strong, Canadian Industries, Montreal, Que.
H. E. Swank, Simonds Worden White Co., Dayton, Ohio.

T

C. W. Tanner, S. A. Armstrong Ltd., Toronto.
N. F. Taylor, Gilbey's Limited, New Toronto, Ont.
Mr. and Mrs. Benjamin E. Teale, Ancram Paper Mills, Ancram, N. Y.
Mr. and Mrs. Killey E. Terry, S. D. Warren Co., Cumberland Mills, Me.
Mr. and Mrs. W. H. Teter, Meade Corp., Kingsport.
Edward J. Thom, Howard Smith Paper Mills, Ltd., Montreal, Que.
A. Hoyt Thompson, Rolland Paper Co., Toronto, Ont.
Murray Thompson, Rochester & Pittsburg Coal Co., Toronto.
Mr. and Mrs. Harry J. Tobin, Gair Co., Canada, Toronto, Ont.
Richard Tobin, National Cellulose Corp., Baldwinsville, N. Y.
Mr. and Mrs. T. W. Toovey, Pennsylvania Salt Mfg. Co., Philadelphia, Pa.
R. J. Tribabey, Foster-Wheeler Ltd., St. Catharines, Ont.
Mr. and Mrs. E. F. Tucker, Stebbins Eng. & Mfg. Co., Watertown, N. Y.
E. L. Tewksbury, Stowe Woodward Inc., Newton Upper Falls, Mass.
G. A. Thompson, Jr., B. F. Perkins & Son Inc., Holyoke, Mass.
Fletcher Thornton, Stowe-Woodward Inc., Newton Upper Falls.
F. J. Timmerman, Northern Paper Mills, Greenbay, Wis.
E. A. Turner, International Nickel Co., New York City.

V

Raymond E. VanCleef, Hamersley Mfg., Garfield, N. J.
Mrs. R. W. VanKirk, Chicago.
G. W. VanSteenbergh, the *Paper Trade Journal*, New York, N. Y.
J. B. Venturini, Cameron Machine Co., Brooklyn, N. Y.
Mr. and Mrs. George Verner, International Equipment Co., Montreal.
C. Vicario, The Nash Engineering Co. Inc., New York City.
Frank W. Vogt, Jos. T. Ryerson & Son, Inc., Chicago, Ill.
J. D. Volckman, Paper Makers Importing Co., Easton, Pa.
Mr. and Mrs. H. W. Vrooman, Don Valley Paper Co., Toronto, Ont.
H. L. Vanderberg, A. E. Staley Mfg. Co., Decatur, Ill.
C. H. Vickery, E. D. Jones & Sons, Pittsfield, Mass.

W

J. M. Walsh, American Cyanamid & Chemical Corp., New York.
E. A. Walther, Asten-Hill Ltd., Valleyfield.
Mrs. L. F. Winchell, Toronto, Ont.
J. G. Wright, Jr., A. M. Meincke & Son, Inc., Chicago.
Mr. and Mrs. A. E. Wagner, Abitibi Power & Paper Co., Smooth Rock Falls.
A. Lucian Walker, Texas Gulf Sulphur Co., New York.
G. K. Walker, Pruyn & Co., Glens Falls.
F. C. Walsh, National Aniline & Chemical Co., Montreal, Que.
Mr. and Mrs. H. T. Walters, G. R. Booth Ltd., Ottawa, Ont.
Mr. and Mrs. G. C. Walton, Downingtown Mfg. Co., Downingtown, Pa.
N. P. Wardwell, Carthage Machine Co., Carthage, N. Y.
Mark H. Waterbury, H. Waterbury & Sons Co., Orkiskany, N. Y.
Mr. and Mrs. J. E. Waterhouse, Montague Machine Co., Turner's Falls.
Mr. and Mrs. J. A. Waters, American Wringer Co., Woonsocket, R. I.
W. A. Watkins, Duriron Co. Inc., Dayton, Ohio.
H. G. Watson, International Nickel Co., Toronto, Ont.
Mr. and Mrs. S. S. Watson, Riegel Paper Corp., Milford.
Mr. and Mrs. Harold A. Webb, Albia Box & Paper Co., Troy, N. Y.
H. F. Weber, Link-Belt Co., Chicago, Ill.
Mr. and Mrs. J. V. Wedgwood, Manhattan Rubber Mfg. Co., Neenah, Wis.
W. J. Weed, Niagara Alkali Co., New York.
Mr. and Mrs. Fred B. Wells, Ohio Blackboard Co., Rittman, Ohio.
Mr. and Mrs. Norman O. Weil, W. S. Tyler Co., Cleveland, Ohio.
L. E. Weiser, National Folding Box Co., New Haven.
Mr. and Mrs. W. Weston, American Wringer Co., Woonsocket, R. I.
Harry E. Weston, *Paper Industry*, Chicago.
Mr. and Mrs. H. R. Wheeler, The Victoria Paper Mills Co., Fulton, N. Y.
Mr. and Mrs. Mark M. Whitman, Marathon Paper Co., Rothschild, Wis.
Miss Jean, Whitman, Rothschild, Wis.
Frank A. Whittiger, Ciba Co., Chicago, Ill.
Wm. Whyte, Whyte Co., Montreal, P. Q.
A. W. Wickham, McAndrews & Forbes Co., Camden, N. J.
Ralph A. Wilkins, Bird & Son Inc., East Walpole, Mass.
Mr. and Mrs. A. B. Williams, American Wringer, Farnham, Que.
Duke Williams, Mead Corp., Chillicothe, Ohio.
Frank H. Williams, Crane & Co. Inc., Dalton, Mass.
Mr. and Mrs. Harry Williamson, Williamson Research Corp., New York City.
L. F. Winchell, Hinde & Dauch Paper Co., Toronto, Ont.
Jas. A. Wise, Kalamazoo Paper Co., Kalamazoo, Mich.
Mr. and Mrs. W. F. Wolfe, MacSimBarr Paper Co., Otsego.
Mr. and Mrs. Vernon Woodside, Mathieson Alkali Works Inc., New York, N. Y.
Paul M. Wright, L. H. Gilmer Co., Philadelphia, Pa.
M. J. Wright, U.P.N. Kidder, Harris Seybold Potter Co. Ltd., Toronto, Ont.
Mr. and Mrs. R. I. Wynne-Roberts, Norton Co., Worcester, Mass.

Y

C. E. Youngchild, International Paper Co., Glens Falls.
B. A. Yule, F. C. Huyck & Sons, Albany, N. Y.
J. C. Yule, Kenwood Mills, Annprior, Ont.

Z

Mrs. G. Zeller, Erie, Pa.
Thelma Zellers, Niles, Mich.
Mr. and Mrs. F. L. Zellers, French Paper Co., Niles, Mich.
Robert W. Zellers, Niles, Mich.
Henry C. Zeni, American Cyanamid & Chemical Co., New York City, N. Y.

Government Paper Bids

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., June 29, 1938—The Government Printing Office has received the following bids for 40,000 pounds (208,000 sheets) of 38x48, 192, supercalendered book paper: Old Dominion Paper Company, 5.58 cents; John F. Post, Inc., 5.75 cents; Whitaker Paper Company, 5.57 cents; Perkins-Goodwin Company, 5.57 cents; Stanford Paper Company, 5.89 cents; Marquette Paper Company, 5.54 cents; R. P. Andrews Paper Company, 5.66 cents; Cauthorne Paper Company, Inc., 5.57 cents; and Walker, Goulard Plehn Company, 5.85 cents.

For 37,400 pounds (400,000 sheets) of 32x42 white sulphite writing paper: R. P. Andrews Paper Company, 6.27 cents; Whitaker Paper Company, 7.04 cents; Old Dominion Paper Company, 6.484 cents; Stanford Paper Company, 6.92 cents; Barton, Duer & Koch Paper Company, 6.25 cents; Marquette Paper Company, 6.5 cents; Aetna Paper Company, 7.12 cents; Paper Corporation of U. S., 6.64 cents; Cauthorne Paper Company, Inc., 6.31 cents; Mudge Paper Company, 6.26 cents; and Enterprise Paper Company, 7.2 cents (skids) and 7.5 cents (cases).

For 60,000 pounds of buff wood bristol board: Old Dominion Paper Company, 4.373 cents; Barton, Duer & Koch Paper Company, 4.34 cents; Marquette Paper Company, 4.19 cents.

For 1,600 pounds (10,000 sheets) of 25x38", 100 per cent rag, antique finish book paper: Mudge Paper Company, 16.24 cents; Stanford Paper Company, 21.5 cents; Paper Corporation of U. S., 20.23 cents; Whitaker Paper Company, 16.18 cents; Mathers-Lamm Paper Company, 29.1 cents; Barton, Duer & Koch Paper Company, 22.75 cents; and R. P. Andrews Paper Company, 27 cents.

Augusta Paper Co. Opens

[FROM OUR REGULAR CORRESPONDENT]

AUGUSTA, Ga., June 27, 1938—The Augusta Paper Company, corner Sixth and Reynolds streets, Augusta's newest wholesale establishment under the management of J. B. Fatman, is now open for business. Mr. Fatman is well and favorably known to the trade having covered this territory for a number of years for the Atlanta Paper Company, with which company the Augusta Paper Company is affiliated.

Mr. Fatman states that the stock which the Augusta Paper Company will carry will be as complete and extensive as any paper house in the South, and that they are prepared to care for the needs of the trade in Augusta trade area, guaranteeing prompt deliveries and efficient service.

FARREL ROLLS *and* CALENDERS Aid in Producing Top Quality Paper

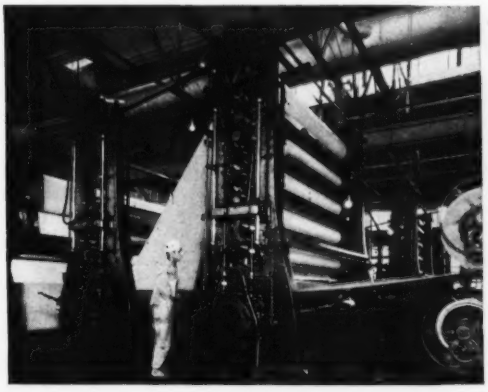
Certain qualities in the rolls of your calender stack appreciably affect the uniformity and quality of your paper. These qualities have distinguished Farrel Rolls for eighty years. They are:

1. Accuracy and smooth finish of bodies and journals.
2. Scientifically correct shape and amount of crown.
3. Uniform hardness and depth of chilled body surfaces.

These qualities are not only important factors in the production of high grade paper but assure trouble-free performance, economy of maintenance and long life.

Farrel Rolls are the product of skill developed by eighty years experience in roll making, the use of only the highest grade materials, constant research, and close control of every manufacturing process from metal mixture and casting to grinding and inspection.

Made in chilled iron or extra hard "Farreloy" in any diameter from 4″ to 72″ and any face length up to 312″. Full information will be sent on request.



Above—Farrel 228″ Ten-Roll Calender Stack with heavy, box type housings, electric lift operated from the floor, fully enclosed boxes with gravity feed lubricating system supplying clean, filtered oil through individual leads to each journal.

Left—"A WHOLE STACK OF ACCURACY"—168″ Calender Stacks at Champion Coated Paper Co., Hamilton, Ohio, equipped with Farrel Rolls.

Precision, durability and operating convenience are built into Farrel Calender Stacks. Equipped with chilled iron or "Farreloy" special hard rolls, automatic lubrication, floor operated lift and other modern features. Any size up to 312″ long on the face.

There are over 100 lathes in this department of the Farrel Roll Shops.

A few of the thirty grinding machines in the Farrel Roll Shops.

FARREL-BIRMINGHAM COMPANY, INC.

50 State St., Ansonia, Conn.

Manufacturers Cooperate to Grow Pulpwood

Definite Steps Taken by Paper Mills and Lumbermen to Cooperate With Wisconsin Conservation Commission to Formulate Long Range Planting Program—Wausau Mill May Resume Operations in July—Other News.

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., June 27, 1938—Definite steps are being taken by paper manufacturers and lumbermen of Wisconsin to develop a future supply of native grown pulp wood. The move will be one of cooperation with the Wisconsin Conservation Commission to work out a long range program, supplementing what has already been done by some of the mills.

An idea which has been germinating for months took definite shape at a meeting of a special committee at Oshkosh, Wis. last week. The committee is composed of state industrialists of the Wisconsin Manufacturers Association headed by J. D. Mylrea of Rhinelander, as chairman. F. E. Sensenbrenner, of the Kimberly-Clark Corporation, Neenah, Wis., is a member. R. B. Goodman of Marinette, Wis., chairman of the Wisconsin Conservation Commission who is interested in lumber and paper mills, obtained approval of a plan through which Conservation Director H. W. MacKenzie will take active steps for the formation of a coordinated pulp wood forestry program with interested business and manufacturing elements. Further meetings will be held during the summer to work out the program.

Long Range Program Favored

Paper manufacturers have found themselves each year farther removed from the source of supply of raw materials, burdened by steeper freight hauling rates, and faced with strong competition of low-overhead mills in the southern states and on the west coast. The situation has culminated in a feeling that the paper industry and the state government should combine their energies to assure a future source of supply. It will be a long-range program, of course, because it requires from 40 to 50 years to grow the spruce and pine varieties most demanded for paper.

Consolidated Planting 1,400 Acres

The Consolidated Water Power and Paper Company, Wisconsin Rapids, Wis., has been one of the leaders in this movement by establishing its own reforestation program. The company is planting 1,400 acres of trees this season on its lands in Forest County, Wisconsin, and 300 acres in Langlade County. This makes a total of approximately 3,000 acres of spruce plantings, most of which has been done in the last three years.

Extensive forests also are maintained by the Nekoosa-Edwards Paper Company, Nekoosa, Wis. Recently this company took steps such as are contemplated by the mills in general by urging a reforestation program for Wood County, where its mills are located.

Additional work of this kind is also going on in the Upper Peninsula of Michigan, from which Wisconsin mills draw part of their pulp wood supply. The pring program in state forests this year amounted to 12,000 acres of planting, with approximately 8,000,000 trees set out. Another 10,000,000 are ready for transplanting from the nurseries in the fall. The nursery this spring received orders for 1,375,000 jack, Norway and white pine seedlings and transplants for privately operated forests.

Government May Rebuild Dam

Rebuilding of an old power dam at Appleton, Wis., serving paper mills there, is contemplated by the United States government. An allotment of $371,500 is contemplated by the War Department for improvements on the Fox River, of which approximately $200,000 will be spent for the new dam. A turning basin also is contemplated at Green Bay, Wis., to facilitate the docking of large vessels carrying European commercial pulp, and pulp wood from Canada. The total allotment is expected to be $61,500.

Safety Conference to Meet at Wausau

Wausau, Wis. has been chosen as the 1939 meeting place of the Wisconsin River Valley Safety Conference, which had its annual session recently at Antigo, Wis. More than 700 attended the sessions. A chairman will be selected soon, and a definite date will be set.

N. S. Stone on Future of Paper Industry

Confidence that the paper industry has a tremendous future was expressed by Norman S. Stone, general manager of the Mosinee Paper Mills Company, Mosinee, Wis., in an address last week to the Kiwanis club at Wausau, Wis.

His prediction is based on the multitude of new uses for paper and pulp products discovered in the last few years, the lack of expansion of plants in the same period, and the increasing per capita demand for ordinary paper products. The time is not far distant, he says, when the paper industry will reach new heights of prosperity.

Even now, with general business at 56 per cent of normal, the paper industry stands at 70 per cent, Mr. Stone asserted. This is 83 per cent of last year's capacity percentage. He expects a resumption of the condition obtaining in 1937 when mills were so swamped with orders it was necessary to allot customers a percentage of the tonnage produced.

Wausau May Resume Operations in July

Hopes of resuming operations about July 1st are entertained by 300 employes of the Wausau Paper Mills Company, Brokaw, Wis., who are working daily to provide a temporary dam to take the place of the one which was partially swept away when the company's hydro-electric plant toppled into the Wisconsin River recently. L. E. De Guerre of Wisconsin Rapids, Wis., consulting engineer, is in charge of the construction.

An old wooden dam abandoned in 1923 is being

Sulphur Service

The Harvest - - - SULPHUR

Over 3000 tons of liquid Sulphur flow daily from the mines of the Texas Gulf Sulphur Company. It is carefully spread in thin layers over an area of 5½ acres and allowed to cool and solidify, resulting in a block of solid Sulphur . . . a vat 160 ft. wide, 1200 ft. long and 50 ft. high . . . a mass of 500,000 long tons of gleaming yellow Sulphur which dramatically implies that here is one of the foundation stones of chemical industry.

The Texas Gulf Sulphur Company has ready not one but several of these huge vats of Sulphur on which to draw for shipments to its many customers. Here is a dependable supply! A uniform product free from arsenic, selenium and tellurium!

• • • •

Research is a dominant part of Texas Gulf Sulphur Company's activities. New arts in the use of Sulphur are being developed involving not only the mining and melting of Sulphur, but also its application in new fields. The most recent is the application of Sulphur in the centrifugal coating and lining of pipe. Reprints of articles describing this and other developments will be sent on request.

TEXAS GULF SULPHUR CO.
75 E. 45th Street New York City
Mines: Newgulf and Long Point, Texas

rebuilt, and the work is faciltated by the fact that the cribs were never blasted out. Heavy timbers are being replaced where needed, and they are being filled with rock from a nearby hill. The dam is about 400 feet long, and is 100 feet from the concrete and steel dam which was damaged. It will afford a 14-foot head of water, six feet lower than the new dam. To increase the flowage, deadheads and other refuse accumulated in the flumes are being removed. The flumes will supply sufficient water to operate the beater lines, supply the filters, and generate direct current. Additional power will be obtained from the Wisconsin Public Service Corporation. Water lines are being lowered to permit gravity flow so as to supply the requirements of 10,000,000 gallons per day.

No further decision has been announced on rebuilding the damaged dam and the wrecked power plant. Harold C. Collins, treasurer, explained to the Wisconsin Public Service Commission when asking for a permit to rebuild the old dam that the present shutdown is adding to losses suffered by the company for the last three years, and that resumption of operations at the earliest possible date is of importance. All unfilled orders are being handled in the meantime by the Marathon Paper Mills Company, Rothschild, Wis. The company hopes to obtain a loan from the Reconstruction Finance Corporation to finance the repairs.

G. W. Kibby Resigns as Director

George W. Kibby has resigned from the board of directors of the Nekoosa-Edwards Paper Company, Nekoosa, Wis. He served on the board for many years, and his retirement was accepted with "great reluctance," John E. Alexander, president, said.

Rusch-Gardiner Nuptials

Robert Rusch, who is with the International Paper Company at Glens Falls, N. Y., and Miss Mary Mortimer of Appleton, Wis., were married Saturday afternoon, June 18, at All Saints Episcopal church at Appleton. Mr. Rusch's home is in Neenah, Wis., and he is a graduate of the Institute of Paper Chemistry at Appleton. The couple is honeymooning in Canada and will be home after July 1 at 68 Notre Dame St., Glens Falls.

Leo A. Gardiner, sales representative of the Nekoosa-Edwards Paper Company, Nekoosa, Wis., and Miss Edna K. Bentson of Elmwood, Wis., were married Saturday evening, June 18, at the home of the bride's sister at Madison, Wis. Both formerly were instructors in the public schools at Appleton, Wis.

Carthage Papermakers Renew Contract

CARTHAGE, N. Y., June 27, 1938—A conference here this week between officials of the Carthage Papermakers, Inc., and the International Brotherhood of Papermakers resulted in a renewal of the existing wage and working contracts until June 1 of next year. The meeting was attended by Urban C. Hirschey, mill owner, and Jacob Stephan, representative of the International Brotherhod of Papermakers. An official of the company announced that no changes had been made in the contract with the union. The previous agreement which expired June 1, this year, had been renewed pending the decision this week.

Obituary

Moritz Eisner

Moritz Eisner, 86, founder of the Newark Paraffin & Parchment Paper Company, died June 19 at his home at Central Park West, New York City.

Mr. Eisner, who was born in Vienna, Austria, was graduated from the Vienna College of Pharmacy at the age of 18. After working in Philadelphia as a pharmacist he returned to his native land to again return to Philadelphia a short time later. At the age of 22 he married Miss Anna Zeitz of Philadelphia.

While acting as import agent for the Johan Hoff Malt Extract Company and the Carlsbad Salts Company, Mr. Eisner laid the foundation for the paraffin and waxed paper business he later organized. As the corks he imported from Spain were too porous, he adopted a method for coating them with paraffin. At the suggestion of his wife who foresaw extensive uses for waxed paper, he was induced to start the wax coating of paper and from this beginning the large waxed paper business was developed.

Mr. Eisner retired from active participation in the company some years ago. At one time he was with the chemical firm of Kramer & Small of Philadelphia, president of the Carlsbad Salts Company and formerly head of the Eisner-Mendelson Company.

Surviving are a son and three daughters. Funeral services were held at the Campbell Funeral Church in New York City.

O. L. E. Weber

O. L. E. Weber, 72, former vice-president of the Watab Paper Company, Sartell, Minn., died of a heart attack in Rome, Italy, while on a trip to Europe accompanied by his wife.

Mr. Weber was vice-president and general manager of the Watab Paper Company from 1918 until his retirement in 1935. He had previously been associated with the Port Huron Sulphite and Paper Company.

Surviving is his widow. The funeral services were held in Detroit, Mich., on June 20th.

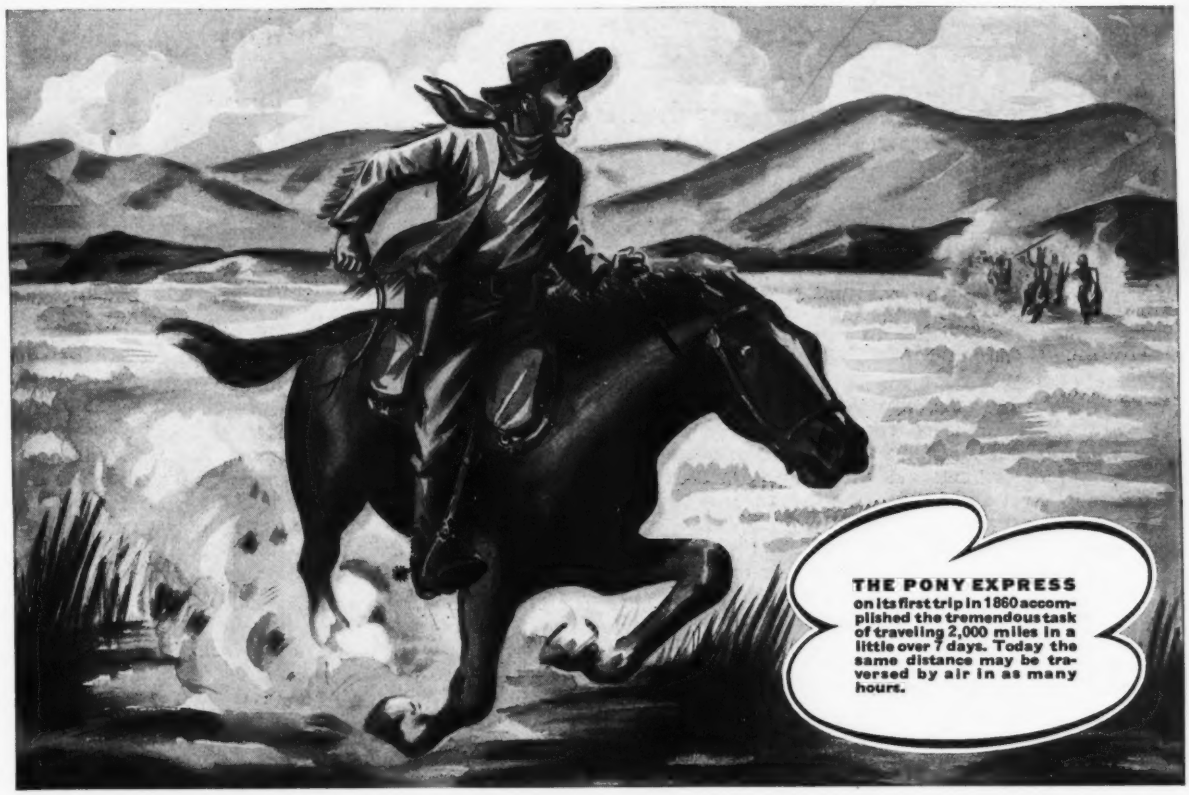
Samuel E. Johnson

HUDSON FALLS, N. Y., June 25—Samuel E. Johnson, for over 35 years employed as a mechanical engineer with the Sandy Hill Iron and Brass Works, died this week at his home after a long illness. He was prominent in fraternal circles. The survivors include two sons, a daughter and two sisters.

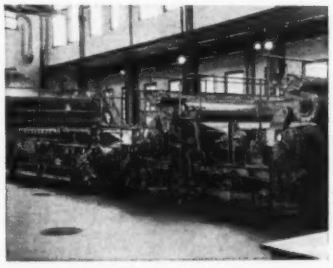
Woodfibre Plant Is Ceased

[FROM OUR REGULAR CORRESPONDENT]

VANCOUVER, B. C., June 25, 1938—Lawrence Killam, president of the British Columbia Pulp and Paper Company, Vancouver, B. C., announces the closing down of the Woodfibre plant of the company, where approximately 300 men were employed. This plant has been specializing in rayon pulp production and was seriously affected by difficulties in rate of exchange, affecting Japanese currency, as a result of the Oriental situation. The Port Alice plant, of the company, closed earlier in the month and for a time it was hoped that operations might be continued in the Woodfibre division, but this was later found impossible.


THE PONY EXPRESS
on its first trip in 1860 accomplished the tremendous task of traveling 2,000 miles in a little over 7 days. Today the same distance may be traversed by air in as many hours.

YESTERDAY'S PROBLEM IS TODAY'S ACHIEVEMENT



Bantam can furnish the engineering knowledge needed and the proper bearings for Press Rolls, Suction Press Rolls, Couch Rolls, Suction Couch Rolls, Dryers, Calender Stacks and other miscellaneous paper mill equipment.

Our engineering suggestions have smoothed out the kinks in many paper mills. Why not take advantage of our experience in your mill?

IF you have a bearing problem that has proved difficult to solve, there's no reason to assume that it can't be done and continue to pay the penalties of inefficient operation.

Many concerns have accepted our invitation to "bring your toughest bearing problem to Bantam". And frequently Bantam engineers have been able to suggest an installation that meant important savings to our customers.

Bantam's long experience in the production and proper application of *all* major types of bearings is yours to command.

BANTAM BEARINGS CORPORATION
South Bend, Indiana

Subsidiary of THE TORRINGTON CO.
Torrington, Conn.

BANTAM BEARINGS

TAPERED ROLLER • • • STRAIGHT ROLLER • • • BALL BEARINGS

Midwest Paper Trade Looks Ahead to Fall

With Low Inventories Reported By Jobbers and Converters and Prices Back to Fair Profit Levels, Outlook for Future is Brighter, Though Seasonal Dullness Now Prevails—Container Corp. Suit—Other Late News.

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., June 27, 1938—The local market picture is still uninviting as far as immediate business is concerned, though there is every reason to believe that by Fall the paper industry will again be beating its way upward. Facts pointing to a full share of any general improvement that may come, are borne out by the extremely low inventories held by converters and jobbers as well as by the fact that virtually all grades of paper have been liquidated to the extent that prices are about back to where they were before the advance got under way.

During the week the prices of rag content papers were reported to have made a major drop of from $0.20 to $0.40 a ton, thus bringing about the last of the groups into a common position. Kraft prices showed more strength during the week and worked back up to a reported four cents, a marked betterment over the low set when prices became shaky a few weeks ago. Kraft executives feel that the readjustment was necessarily one of reflecting the actual condition of the basic market itself. Sulphite bonds made no change during the week. Books and covers remained about the same as did groundwoods and newsprints. The waste paper market continued "very weak"with little promise of major betterment for some time to come according to local waste outlets.

Container Damage Suit Still Pending

The suit brought by the Thomas Paper Stock Company against the Container Corporation of America for alleged damages bids fair to become "just another law suit" as the case continues to be pending without little possibility of any action this year. The original suit found A. E. Sandroft, president of the Thomas Paper Stock Company, asking for $1,500,000 against Container and its three subsidiaries because "his company's business in waste paper was being jeopardized by the corporation's activities". Mr. Sandroft claimed, in the petition for damages, that the defendants controlled 90 per cent of the waste paper market in Chicago and were attempting to shoulder him out of the business. A decision was originally expected around May 15 but the case has been continued and with no definite date for action.

Legislature Tax Threats Wane

It begins to look as though the paper and printing industry was going to sidestep House Bill 28, the "Producers tax" which has been occupying a part of the time of Illinois solons during the Special Session of the Legislature. The measure is on third reading in the House with the end of the Session near and a more or less hostile Senate ready to pounce on the bill if the House does give last minute approval. If the measure were passed it would place the tax liability onto the printers and other paper users who would be considered the "ultimate consumers" under the Retailers Occupation tax. As it now stands, the printers are the "ultimate consumers" with the paper sources the "retailers".

Industry also found itself freed of S.B. 8, the "use tax" designed to tax all materials purchased outside the state for use in business in Illinois. In other words, all materials taxable under the Retailers Occupation tax and exempt because of interstate commerce restrictions, were to be assessed three per cent under S.B. 8. The measure was dropped by the Senate Revenue committee this week thus leaving the only revenue avenues open for relief purposes the tobacco tax which may be the avenue of escape for the politicians—and others as well.

New Midland Bond Item

The Midland Paper Company, Chicago division of the Zellerbach Paper Company, is announcing John Edwards Bond, made by the Nekoosa Edwards Paper Company. A comprehensive discussion of folding, tearing, erasing, writing, typing, printing and formation qualities is illustrated in the folder printed on Canary, Substance 20 and the ingredients of quality and economy are given special mention. The paper is "pre-tested" and comes in white and eight colors including green, blue, buff, canary, goldenrod, pink, grey and salmon. Matching envelopes are available.

Warrens' Business Bulletins

The constructive effort of the S. D. Warren Company to teach the public to appreciate American business, and bound up in a series of fourteen bulletins originally designed to service Warren employees, seems certain to be credited as one of the most constructive efforts made by the paper industry during the year. The set of fourteen is being offered to business executives in a neat announcement printed on Warren's Cumberland Dull Post Card and appropriately illustrated by a Gluyas Williams sketch. It is understood that several publications plan to give further widespread distribution to the Business Bulletins.

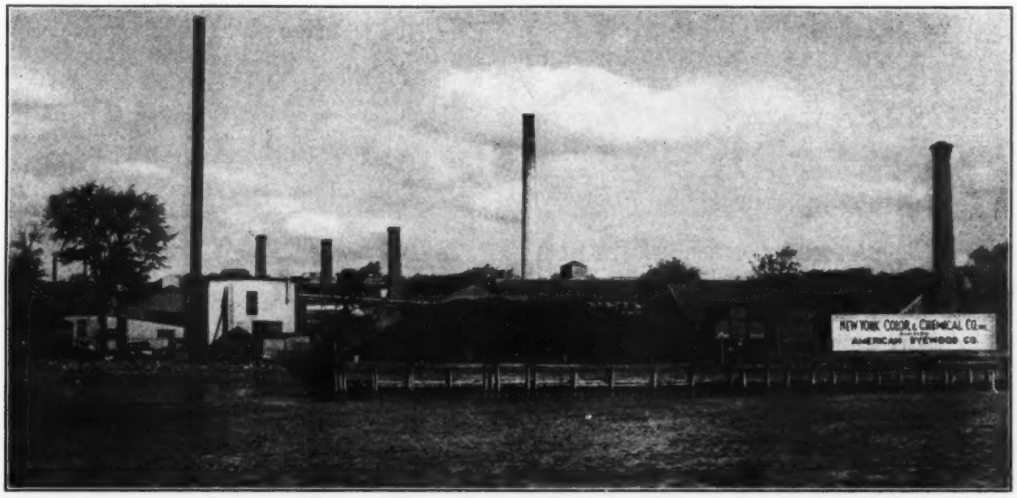
Kimberly-Clark Issue Broadside

The Kimberly-Clark Corporation, 8 S. Michigan avenue, Chicago, has recently distributed a broadside illustrating the possibilities of Kleerfect and Hyfect papers for letterpress and rotogravure printing also listing other features including Rotoplate, Kimpack packing material, Kimflex shoe insoles and counters and Kimsul building and refrigerator insulation. The broadside is printed in rotogravure, the inside spread providing a testimonial expression from the Formfit Company and the two outside pages providing real news interests by illustrations of a number of Governmental agencies at work investigating through the Treasury, Labor, Agricultural and Commerce Division offices.

A FAST TINTING BLUE for.. HIGH PH WHITE PAPERS . . .

NYCO LIQUID BLUE 2RHA

A new addition to Nyco fast tinting blues in non-settling, free-flowing liquid form. It retains its shade, strength, and fastness to light in the presence of calcium carbonate filler.



The HOME of NYCO products

Since 1916, technicians—experts in their field—are here producing quality dyestuffs and allied products for the exacting requirements of the paper manufacturer.

Modern research and laboratory facilities are available to assist in solving your color problems.

NEW YORK COLOR & CHEMICAL CO.

DIV. OF AMERICAN DYEWOOD CO.

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Financial News of Pulp and Paper Industry

E. A. Wise Bid of $31,023 for Bankrupt Sherman Paper Co. Accepted By Creditors—West Virginia Declares Dividend—Minas Basin Reports Good Profit for Year—Detroit Paper Pays Dividend on Preferred Stock.

NEW YORK STOCK EXCHANGE

High, Low and Last for the Week Ending June 29, 1938

	High	Low	Last
A. P. W.	3⅝	3	3⅝
Armstrong Cork Co.	38⅞	33	38½
Celotex Corp.	21½	18⅛	21¼
Celotex Corp., pf.	61	59	61
Certain-Teed Products Corp.	8⅛	6⅜	8¼
Certain-Teed Products Corp., pf.	31¾	25½	30¾
Champion Paper & Fibre Co.	26½	21⅞	26
Champion Paper & Fibre Co., pf.	95	95	95
Congoleum-Nairn Co.	22	18¾	22
Container Corp. of America	14¾	13¾	14¾
Continental-Diamond Fibre Co.	8⅝	7½	8¼
Crown-Zellerbach Co.	11½	9¾	11¼
Flintkote Co.	19⅜	16⅜	19⅜
Robert Gair	4	3⅜	4
Robert Gair, pf.	14	12⅞	14
International Paper & Power	8⅞	7⅜	8
International Paper & Power, pf.	39	30¼	39
Johns-Manville Corp.	92¼	78⅜	92¼
Johns-Manville Corp., pf.	129½	129½	129½
Kimberly-Clark Corp.	24¾	23½	24¾
MacAndrews & Forbes	29	28½	29
MacAndrews & Forbes, pf.	122	122	122
Masonite Corp.	40¾	33¼	40
Mead Corp.	12½	10⅛	12½
Mead Corp., pf.	57	57	57
Paraffine Companies, Inc.	42½	36¾	42½
Ruberoid Co.	23	19¾	23
Scott Paper Co.	42	40¾	42
Sutherland Paper Co.	25⅜	24½	25⅜
Union Bag & Paper Corp.	12⅝	10¼	12½
United Paperboard Co.	6⅛	4⅞	6⅛
U. S. Gypsum Co.	96	77½	94¾
U. S. Gypsum Co., pf.	169¾	169¾	169¾

NEW YORK CURB EXCHANGE

High, Low and Last for the Week Ending June 29, 1938

	High	Low	Last
American Box Board Co.	9½	9⅛	9
Brown Co., pf.	25⅛	24	25
Great Northern Paper	30	29½	30
St. Regis Paper Co.	3⅜	3⅛	3⅜
St. Regis Paper Co., pf.	61	59	61
Taggart Corp.	5⅜	4¼	5⅜

Wise Bids for Sherman Properties Accept

GREAT BEND, N. Y., June 27, 1938—A meeting of creditors of the bankrupt Sherman Paper Company was held last week before Judge Conboy, referee, at which they voted approval of acceptance of the $31,023.16 offer of Mrs. E. A. Wise for the properties. The company operated mills in this village, Felts Mills, and Lefebvre. It was decided to advertise the sale for June 30 when the mills and equipment will be disposed of to Mrs. Wise at that price unless a better offer is made. She is the original holder of a first mortgage on the Felts Mills plant and second mortgages on the other properties, acquired all other mortgages, and now holds mortgage obligations amounting to $180,163.79. Her bid is over and above mortgages and she is to be given a deed free of all tax and other liens. Unpaid taxes against the properties amount to $22,256.80 for 1936 in Jefferson county and $902.03 in Lewis county; and $19,124.24 of 1937 Jefferson county taxes, of which the estate will pay one-third or $8,751.11, the approximate amount which accrued during the four months that the mills were operated after receiving reorganization privileges.

Application for permission to reorganize was made in the fall of 1937 and granted by Federal Judge Bryant a few days later. The company was forced into bankruptcy early this year. O. Palmer Barnes, trustee, was present at the meeting as was his counsel, who explained in detail the offer by Mrs. Wise and the entire situation. Counsel for the trustee informed the creditors that the taxes must be paid and that by accepting the offer of Mrs. Wise the bankrupt estate would be effecting a saving of approximately $15,000. At the present time in the hands of the trustee now is about $27,000 so that unsecured creditors will receive a small dividend. It is understood that Mrs. Wise hopes to bring about a sale of the properties to interests which will resume operation of the plants.

Minas Basin Reports Good Year

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., June 27, 1938—The report of the Minas Basin Pulp and Power Company, of Hantsport, N. S., for 1937 shows a gross trading profit of $149,672 and a net profit after all charges of $22,236. Comparative figures for 1936 are not available, but in that year there was a deficit of $7,797 after all charges.

During the past year the company carried out a heavy program of capital expenditures, outlay totalling $400,989. Of this sum, $63,167 was spent on the mill extension; $77,540 on timber limits; and $281,598 on the St. Croix property. These are the gross expenditures, certain credits being reported in the way of stumpage cut and sold, etc.

Subsidiaries of Minas Basin report a good year. Canadian Keyes Fibre Company was able to finance without any assistance from the parent company and also reports a reduction in indebtedness. Investment in Annapolis Basin Pulp and Power was increased to $21,885 by a further purchase of shares in that company. In addition, Minas Basin acquired 555 shares of the capital stock of Maple Leaf Lumber Company.

In reporting on the outlook for the company, Albert Parsons, president, stated: "Our largest customer, Scott Paper Company, has contracted for increased tonnage to extend over a period of years and your company is thus assured of a firm market for the greater part of its production, even when the new additions are in operation."

Declares Dividend

West Virginia Pulp and Paper declared a dividend of 5 cents a share on the common stock, payable July 1 to stock of record June 21. A payment of 10 cents a share was made April 1.

Detroit Paper Products Quarterly

Although the regular quarterly dividend was declared on the preferred stock of the Detroit Paper Products Corporation, no action was taken on the common as was the case three months ago.

DE LAVAL

FROM its inception this company has specialized on steam turbines and gears and centrifugal machinery of the same general characteristics and requiring the same type of equipment, methods and skill for its production.

STEAM TURBINES

Of the impulse type, single-stage, velocity-stage and pressure-stage types, and for all steam conditions, including high pressure, condensing, back pressure, bleeder and low pressure and mixed-flow service. Specifically adapted to modern high pressure, high temperature steam.

CENTRIFUGAL PUMPS

Single-stage and multi-stage, for all deliveries and heads, from small motor-mounted pumps up to the largest water works pumping units and feed pumps for high pressure boilers.

Also propeller pumps for large volume, low head service and the De Laval-IMO rotary displacement pumps for oil.

BLOWERS and COMPRESSORS

Single-stage and multi-stage, for all capacities and for pressures up to 100 lbs., including blast furnace blowers, gas exhausters and boosters and compressors for ore flotation and activated sludge treatment of sewage, etc.

SPEED REDUCING GEARS

Of the double helical type, as for driving D.C. and A.C. generators, large pumps and blowers, ships' propellers and other slow and moderate speed machinery. Worm Gears for motor or turbine drives of various classes of machinery and under adverse conditions of grit, moisture, shock loads, etc.

Special catalogs upon request

DE LAVAL STEAM TURBINE CO.

TRENTON, NEW JERSEY

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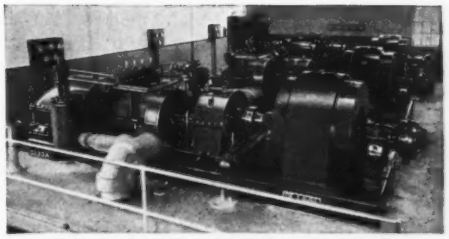
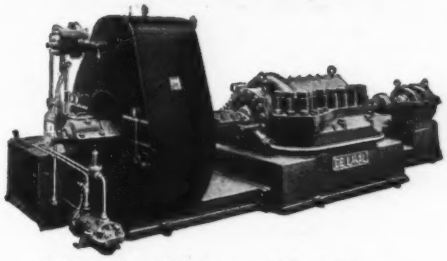
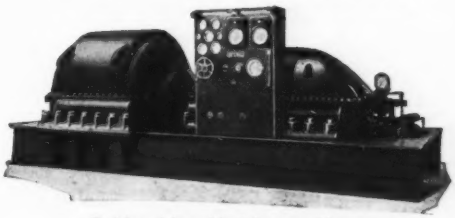


Turbines producing power from process steam

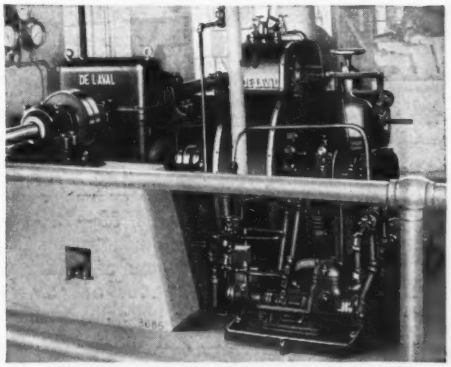
Geared turbine driving forced draft fan



Turbine driven high pressure boiler feed pump



Turbine driven blast furnace blower



Turbine and worm gear driving paper machine

George W. Millar & Co. Have Outing

The annual outing of the officers and staff of George W. Millar & Co., Inc., took place on Saturday, June 25, at Karatsonyi's Hotel, Glenwood, L. I. A large sight-seeing de luxe bus left the company's office at 10 A.M. and on arrival at the hotel a sumptuous breakfast was served, after which all hands repaired to the baseball field where two baseball games and a series of athletic events were run off.

The first baseball game was between the inside men as the Pencil Pushers and the salesmen as the Paper Peddlers. This game was won by the former by a score of 21 to 3. Judge J. J. Dillon was the umpire and, as usual, his decisions were unanimously voted as being strictly punk. Charlie Strang, the strike-out king, fanned the ether each time, and during the five times he was at bat both the infield and outfield of the opposing team occupied reclining positions at their stations, while Bill Goirn went through the motion of pitching three balls, while our hero punctured big holes in the atmosphere.

The second ball game was between the Weary Willies and the Never Sweats, won by the former 4 to 3. Carl Schorske umpired this contest and as an umpire Carl is a good judge of paper. Larry McMahon and Walt Conkey essayed a golf match and after playing 9 holes both contestants passed out of the picture due to something they had eaten, or "sumpin".

Few at the outing recognized Dan Browning with his new Chinese haircut and Leo Reed was missed more particularly by the bunch that depend on him to bring along a dozen or so of large Bermuda onions to eat between innings of the ball game.

The athletic events were decided as follows:

60 YARD DASH—1st, William Jennings, Jr.; 2nd, L. C. Greenman; 3rd, Dan Browning.

HORSE SHOE PITCHING—1st, Jack Smith; 2nd, Mel Reynolds; 3rd, Hayward Beatty.

BASEBALL THROW—1st, Russel Passfield; 2nd, Arthur Collins; 3rd, Carl Nygren.

SHOE RACE—1st, E. A. Dillon; 2nd, W. W. Martens; 3rd, C. Matson.

Non players' prizes were won by the following: J. J. Dillon, Harry Werner, Thomas Miller, W. H. Jenkins, J. J. Murphy.

In the evening dinner was served, during the course of which a rather suspicious looking loving cup of an odd shape with only one handle was presented to Harry Werner, the chairman of the Outing Committee. Jack Athey, the Scotch minstrel, entertained the boys with his accordion and singing of popular songs.

Jim Levens, president of the company, was on hand and presented the thirsty athletes with a keg of beer and Judge Dillon, not to be outdone, did likewise and a good time was had by all.

Goes with Smith, Dee & Lane

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass, June 27, 1938—B. L. Chilcott, formerly engaged in the manufacturing division of the paper industry, has become associated with Smith, Dee & Lane, representatives of companies making paper and wood products, as salesman. Mr. Chilcott will cover metropolitan Boston.

Bag Men To Hold Joint Meeting

[FROM OUR REGULAR CORRESPONDENT]

PHILADELPHIA, Pa., June 27, 1938—Bag manufacturers and their distributors in Philadelphia and its immediate vicinity will hold a joint meeting on October 12, 1938, in Philadelphia. With almost a hundred per cent attendance at the final summer meeting of the Paper & Bag Jobbers' Association of Philadelphia, held recently in the offices of Arthur H. Lewis, secretary, plans for this joint meeting were formulated. Myer Goldman, who took over the chairmanship of the Association several months ago, presented some very concrete ideas which were received with hearty enthusiasm by all those present. The hope was expressed that the fall meeting between the Philadelphia jobbers and their sources of supply will do much to iron out any difficulties and to inculcate a friendlier spirit of cooperation. Said Mr. Goldman: "With the thought in mind that there should be much more harmony between the jobbers and the manufacturers, we are calling this gathering in the hope that new interest will be developed on the part of our membership and also that our sources of supply may become even better acquainted with our difficulties than they are at present. We expect to bring together the important bag manufacturers supplying this territory and their distributors. We have problems as well as the manufacturers and by a spirit of cooperation we trust we can render mutual assistance."

Arthur Lewis, secretary, stated that the session would be a friendly get-together around the dinner table where mutual problems could be discussed, and there was no doubt in his mind that a considerable amount of real progress could be accomplished by this gathering.

Chairman Goldman appointed the following to serve as a committee for the furtherance of this joint meeting: Ben Kessler, chairman; Frank Dubin of the Dubin Paper Company, Paul Wachs of Wolf Paper Company, Chester, and Arthur Lewis.

Start Work on Ecusta Paper Mill

BREVARD, N. C., June 27, 1938—Work has been started on a small scale at the site of the $2,000,000 plant to be erected at Pisgah Forest, near Brevard, for the Ecusta Paper Corporation that will manufacture cigarette paper.

Construction work has started on a temporary office building for Fiske, Carter Construction Company of Greenville, S. C., which has the contract for the erection of the plant. Work has also been started on a water tower which will serve cement mixers and other purposes.

Thirteen buildings will be erected on the property of the company. They will house four cigarette paper-making machines, other machinery, and the process departments which will make high-grade cigarette paper from flax.

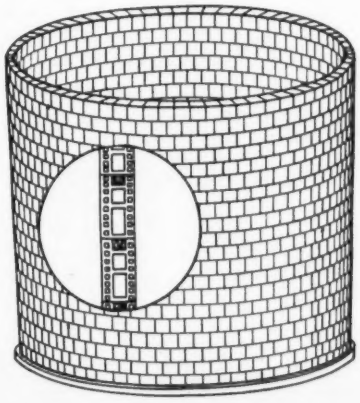
Plans call for starting operation of the plant itself sometime during the early part of 1939. It will give steady employment to 400 people. It is expected that between 100 and 200 people will be given employment on the construction work, all of whom will be strictly local people, with the exception of foreman and a few skilled workers.

The plant will be one of the most modern cigarette paper manufacturing units in the world when completed.

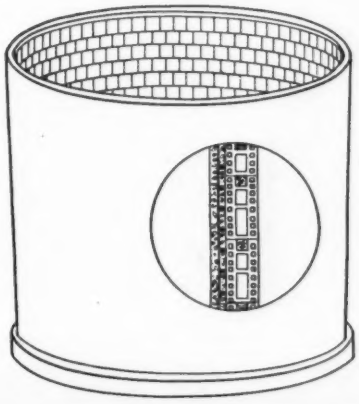
STRONGER, MORE LASTING, MORE SATISFACTORY

Stebbins SEMCO Hollow Tile Tanks — whether single or double wall — of conventional or special design — circular or rectangular — of ordinary or special tile walls — ALL are *better* tanks because they are designed and erected by an organization with over 54 years of successful, specialized service in supplying corrosion-resisting linings and tanks to the leading pulp and paper mills.

Stebbins SEMCO Concrete and Tile Tanks — of 10,000 to 125,000 cubic feet capacity—designed and erected by Stebbins under the Hewett System of Prestressed Design — permit the practice of economies and operating methods never before possible. They are economical in first cost — designed to meet individual operating conditions — and exceptionally long lived.



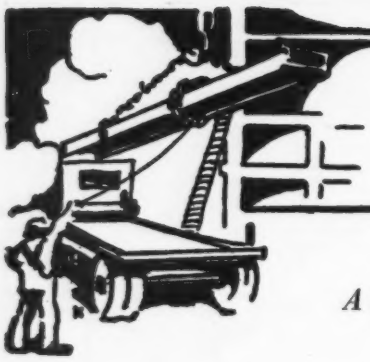
Designs, specifications and estimates for the erection of any tile or concrete and tile tank or reservoir — large or small — submitted on request.



SEMCO

Stebbins Engineering and Manufacturing Company

WATERTOWN, NEW YORK



CONSTRUCTION NEWS

A Summary of Vital Facts Regarding Construction, Financing and Operation of Pulp and Paper Mills

General Construction News

Portland, Ore.—The Crown Zellerbach Corporation, 343 Sansome street, San Francisco, Cal., manufacturer of general paper products, has preliminary plans under way for new two-story and basement building at Fifth and Davis streets, Portland, to be used as a branch storage and distributing plant. An architect will be selected for project at early date. Cost reported over $65,000 with equipment. W. D. McWaters is local manager for company at Portland.

Chicago, Ill.—The Scientific Paper Products Corporation, 4921 Maypole avenue, recently organized with capital of 500 shares of stock, no par value, plans early operation of local plant for the manufacture of a line of paper boxes, cartons and other containers. Incorporators of new company include G. Chilcote, L. Kopinski and H. A. Moltros, address noted.

Houston, Tex.—The Bemis Brothers Bag Company, 601 South Fourth street, St. Louis, Mo., manufacturer of paper bags and containers, paper sacks, etc., has completed plans and is asking bids on general erection contract until July 11 for new addition to branch plant at 2002 Lyons avenue, Houston, to be two-story and basement, 80 x 82 feet, estimated to cost close to $50,000, with equipment. It is proposed to begin work on superstructure at early date. Company engineer, St. Louis office, is in charge.

Richmond, Va.—The Dixie Container Corporation, recently organized, has active work in progress for establishment of new plant at Seventh and Hospital streets, to occupy buildings formerly used by the American Locomotive Company at that location, as noted recently in these columns, aggregating close to 50,000 square feet of floor space. Equipment installation is being placed under way and it is proposed to have plant ready for operation at early date. It will have facilities for an initial production of about 15,000 tons of containers, cartons, etc., per annum. Charles A. Felvey is vice-president of company in charge.

Los Angeles, Cal.—The Los Angeles Paper and Excelsior Company, 1919 Bay street, general paper goods, has approved plans for new one-story building at location noted, to be 81 x 94 feet, designed for general storage and distributing service. It is estimated to cost about $22,000, with equipment. General erection contract has been let to E. P. Rapp, 945 North Serrano avenue, Los Angeles, and work will be placed under way at once. F. E. Stanbery, 1584 West Washington boulevard, Los Angeles, is consulting engineer.

Nitro, W. Va.—The American Viscose Corporation, 200 Madison avenue, New York, N. Y., manufacturer of viscose rayon products, has plans under way for expansion and improvements in branch mill at Nitro, consisting of new mill units and installation of equipment to double approximately present capacity. Cost reported over $250,000, with machinery. Work is scheduled to be placed under way soon. W. A. B. Vivian is manager at mill.

Natick, Mass.—The Natick Box and Board Company, North Main street, manufacturer of folding boxes and other containers, has begun erection of new two-story and basement addition to plant, 60 x 100 feet, recently noted in these columns, to be used for storage and distribution, and will push to completion at earliest date. It is reported to cost close to $40,000, with equipment. Loren & Marsh, 38 Norfolk street, Arlington, Mass., are general contractors.

Dearborn, Mich.—The Ford Motor Company is carrying out an expansion program at its paper mill at the River Rouge plant, including the construction of a new addition and installation of new hydraulic press and mechanical-drying unit for the production of resin and stanolite board products used in automobile construction. Considerable increased capacity is being arranged. This is part of a major expansion and development project at the plant, in progress for a number of months past and now being pushed to early completion.

Chester, Pa.—The Scott Paper Company, manufacturer of tissue papers, has plans maturing for new additions to mill for considerable increase in present capacity. Work will include the installation of a new paper machine with auxiliary equipment, additional finishing machinery, storage and distributing facilities. Entire project will be carried out over a period of months and will represent a large investment. Contracts are scheduled to be placed at early date.

Beaumont, Tex.—Thomas M. Royal & Co., Seventh street and Orange avenue, Philadelphia, Pa., manufacturer of paper bags and containers, will soon begin operations at new branch plant at Main and Gilbert streets, Beaumont, where building was leased recently, as previously reported in these columns. Equipment installation is being made ready for production, which will include waxed paper containers and kindred specialties. Sizable capacity is being arranged. Victor Ambler is local manager at Beaumont.

Valleyfield, Que.—The Valleyfield Coated Paper Mills, Ltd., manufacturer of glazed and metallic coated paper stocks, etc., plans rebuilding of portion of mill recently destroyed by fire with loss reported at close to $175,000, including equipment. Reconstruction is expected to cost approximately a like amount.

New Companies

New York, N. Y.—The Lincoln Boxboard Corporation has been incorporated with capital of 200 shares of stock, no par value, to manufacture and deal in boxboard containers and allied products. Company will operate in the Bronx. It is represented by Gershon & Strell, 10 East Fortieth street, attorneys.

Philadelphia, Pa.—The Economy Expansion Envelope Company, 1916 York street, has filed notice of organization to manufacture and deal in commercial envelopes and kindred commercial paper goods. New company is headed by Joseph T. Graham, address noted, and Edward E. Smith, 110 East Coulter street, Collingswood.

Los Angeles, Cal.—The Los Angeles Envelope Manufacturing Company, 3905 Broadway place, has filed notice of organization to manufacture commercial envelopes and kindred paper products. New company is headed by Floyd O. Williams, 228 West Thirty-ninth street, Los Angeles.

Wilmington, Del.—Duthue & Osborn, Inc., care of Corporation Trust Company, Industrial Trust Building, Wilmington, has been chartered under Delaware laws with capital of 240 shares of stock, no par value, to manufacture and deal in paper products of various kinds.

Functioning of Industry Committees

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., June 27, 1938—The paper industry of the country together with every other industry will be vitally interested to see how the new wage-hour bill is going to work out.

One thing which undoubtedly will be of importance is that of the functioning of the industry committees to be set up by the administrator of the act to make wage investigations and to recommend to the administrator appropriate minimum wage rates for the industry for special classifications therein.

According to the new act, each of these industry committees is to consist of an equal number of persons representing employees, employers and the public with due regard being given to the geographical regions in which the industry is constituted. Under the law one of the representatives of the public will have to be designated as chairman. Two-thirds of the members of the committee are to constitute a quorum and decisions are to be made by the vote of the majority of all members.

The industry committee, under the law, is to recommend such reasonable classifications within the industry as it determines to be necessary in order to fix for each classification the highest minimum wage-rate, not in excess of 40 cents an hour, which would not substantially curtail employment or give a competitive advantage to any group in the industry. The committee also is to recommend for each classification the highest minimum wage-rate, which, in its judgment, would not substantially curtail employment.

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COMING EVENTS IN THE PAPER INDUSTRY

TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY. Fall meeting, Northland Hotel, Green Bay, Wis., September 8-10.

AMERICAN PULP AND PAPER MILLS SUPERINTENDENTS ASSOCIATION. Annual meeting, Royal York Hotel, Toronto, Ont., June 22-24.

EFFECT OF WAGE-HOUR ACT

The new Wages and Hours Act which becomes effective in four months or in October, will impose upon most business enterprises restrictive measures which are likely to prove as drastic as the former National Recovery Act. Although business men may not now be generally aware of the probable effects of this law, the broad scope of the Act will soon be felt in the regulation by political power in Washington of all business enterprises coming within its provisions. The law will immediately affect the hours of work and the total wages of approximately 2,500,000 employees. About 750,000 workers will have their hourly rates of pay increased in October. A few thousand children under sixteen years of age now employed must terminate their employment in the Autumn.

The new law will fix minimum wages of 25 cents an hour for the first year, 30 cents an hour for the second year and 40 cents an hour as soon as "economically possible". It fixes a maximum work week of 44 hours for the first year, 42 hours the second and 40 hours thereafter, when overtime will be put on the basis of time and one-half.

The exemptions to the law will include all executives, all administrative employees, all employees in retail trade, service trades, agriculture, seamen, the fishing industry, weekly and semi-weekly newspapers of less than 3,000 circulation, and some workers in the first processing of farm products. Others exempted are workers in interstate motor transportation, railroads, first processing of dairy products, cotton ginning, processing sugar beets, sugar cane, maple sap and workers in seasonal occupations.

It is impractical, of course, to attempt to speculate as to the relative importance of the hours and wages provisions. In the earlier months of its enforcement most employers will probably be affected by the new limitations imposed on hours of work, while many employers will be affected by the minimum wages above the 25-cent minimum. This hourly minimum wage and the 30 cent minimum stipulated for the second year, may or may not be the actual minimum wage during those years. The new law provides for increasing minimum wages to 40 cents an hour as quickly as it can be accomplished without too great a disturbance of employment.

The Wages and Hours Act will be enforced by an Administrator of the Labor Standards Act, who will be appointed by the President and confirmed by the Senate. Under the flexible terms of the Act, broad powers are given the Administrator. He will, for example, appoint one or more industrial committees for each industry. Each committee will consist of an equal number of representatives of the public, of employers and of employees. The Administrator can instruct these committees to meet at any time after the law becomes effective in October, to increase minimum wages above the 25 cent rate, up to 40 cents an hour.

The Administrator may not accept the committees recommendations but can appoint new committees at his discretion. This means that the Administrator may at once establish a minimum wage above 25 cents an hour and up to 40 cents an hour. Formal procedure is the only limitation imposed upon the Administrator.

Regional differences or the establishment of differentials between the North and the South will rest with the Administrator and the committees he appoints. The law merely says that the "highest minimum wage rate" which "will not substantially curtail employment", and that "no rate shall be fixed solely on a regional basis". The law also states that the Administrator and committees must consider competitive conditions "as affected by transportation, living and production costs". This may be inferred to include differentials, though it is not so stated in the Act.

The status of workers now employed more than 44 hours a week must, of course, be changed. If the employer so desires he may pay as much for 44 hours of work as for the higher prevailing total, or he may pay time and one-half for the extra hours and continue his existing wage schedules; or he can cut hours and cut pay, providing the pay is not cut below the hourly minimum. Clerical office workers or the "white collar" class will be affected by the hour limitations in the early days of the new law.

Seasonal employment and work which must be done within a short period and which necessitates longer hours than usual schedules, are provided for. Exemptions may be made for this type of work, provided it does not extend for a longer period than 14 weeks in one year. The probable effect of the law for nearly all industries at the end of two years will be a uniform 40 hour week. That may mean that the total income of many hourly paid workers will be reduced. Authors of the law expect that employers will add new workers rather than pay time and one-half for overtime.

The law has some good points and many shortcomings. The greatest objectionable feature is the political power over business it invests in its Administrator appointed by the President. Although it is one of the important steps in the socialization program of the New Deal, time alone can justly appraise the merits and demerits of another experiment and further extension of bureaucratic control.

I. P. Plant at Springhill Starts

SHREVEPORT, La., June 27, 1938—The big $12,000,000 Southern Kraft Corporation paper mill at Springhill started production Tuesday, June 14, with one paper machine operating and quantities of brown pulp being manufactured. Bleaching sections are ready for operation, but immediate production will center on the brown product. Some pulp, bleached and unbleached, will be shipped to various International Paper company plants, parent company of Southern Kraft.

As rapidly as operation of all departments can be synchronized into high speed, various other sections of the plant will go into operation, officials said. No definite date for full production has been set and there will be no formalities in connection with putting the plant into operation.

First production at the plant began approximately 10 months after its construction was started and only three days more than a year after plans to put up the plant first were announced as part of the general industrialization program put into effect by Gov. Richard W. Leche. The announcement that International Paper Company would locate its biggest plant in North Louisiana came on June 11, 1937, and first ground was broken at the site late last August.

During construction the plant employed an average of about 1,700 persons daily at peak periods and will employ about 2,000 when full operation is reached.

Work now is getting under way across the Springhill-Sarepta highway from the mill on a model residence section where an initial project of some 300 homes for workers is being built.

Study Waste Disposal

The Continental Diamond Fibre Company has retained W. H. & L. D. Betz, chemical engineers, as consultants to make a study on proper methods to be employed for waste disposal at their Bridgeport (Pennsylvania) plant. This study is now in progress. Waste under study includes black liquor from cookers, washer water and white water.

Production Ratio Report

The statistics are based upon paper production reports to the American Paper and Pulp Association.

COMPARATIVE MONTHLY SUMMARIES

Months	1938(c)	1937(c)	1936	1935	1934
January	63.9%	90.3%	76.1%	65.8%	.....
February	68.7%	90.1%	77.9%	70.0%	.....
March	69.6%	90.3%	76.0%	70.5%	.....
April	68.3%	92.1%	82.3%	70.0%	.....
May	69.0%	90.6%	81.6%	69.4%	.....
June	.....	87.3%	80.7%	72.3%	.....
July	.....	81.8%	77.3%	64.9%	.....
August	.....	82.9%	81.5%	70.9%	.....
September	.....	78.6%	80.5%	71.9%	58.2%
October	.....	73.5%	87.6%	75.6%	64.7%
November	.....	61.9%	88.0%	75.3%	61.7%
December	.....	54.5%	85.9%	71.2%	59.6%
Year Average	.....	80.6%	81.3%	70.5%	.....
First 24 weeks	67.6%	90.3%	79.1%	69.2%	.....

COMPARATIVE WEEKLY SUMMARIES

CURRENT WEEKS, 1938		CORRESPONDING WEEKS, 1937	
*May 14	67.7%	May 15	90.9%
*May 21	69.7%	May 22	91.2%
*May 28	71.5%	May 29	90.8%
*June 4	62.4%	June 5	85.3%
*June 11	65.4%	June 12	88.2%
*June 18	65.6%	June 19	89.2%

The following statistics show the number of mills reporting by ratio groups:

	Number of Mills Reporting, Current Weeks					
Ratio Limits	May 14, 1938	May 21, 1938	May 28, 1938	June 4, 1938	June 11, 1938	June 18, 1938
0% to 50%	96	97	82	129	105	83
51% to 100%	214	213	225	169	183	135
Total Mills Reporting	310	310	307	298	288	218

* Subject to revision until all reports are received.
(c) Basic capacity data have been adjusted to correspond with ratings reported by individual companies.

PAPERBOARD OPERATING RATIOS

According to reports from the National Paperboard Association, per cents of operation, based on "Inch-Hours", were as follows:

Mos.	1938 (e)	1937 (e)	1936	1935	Mos.	1938 (e)	1937 (e)	1936	1935
Jan.	55%	80%	61%	61%	July	....	67%	69%	59%
Feb.	61%	86%	67%	67%	Aug.	....	74%	75%	65%
Mar.	60%	87%	68%	67%	Sept.	....	70%	76%	69%
Apr.	57%	89%	70%	61%	Oct.	....	66%	82%	76%
May	58%	86%	68%	61%	Nov.	....	56%	79%	70%
June	....	75%	68%	65%	Dec.	....	46%	74%	60%

Week end. May 14, 1938—56%
Week end. May 21, 1938—58%
Week end. May 28, 1938—60%
Week end. June 4, 1938—48%
Week end. June 11, 1938—58%
Week end. June 18, 1938—53%

(e) Basic figures revised to include new members of the National Paperboard Assn.

Pulp Shipments Revive Old Port

FERNANDINA, Fla., June 27, 1938—Marking a revival of shipping in one of the oldest ports on the Atlantic seaboard, the S.S. Maltran recently loaded here the first water shipment of paper pulp made from Florida slash pine, destined for Philadelphia, from the dock of the new pulp mill of the Container Corporation of America. A century and a half ago, this community, the second oldest settlement in the country, was the busiest port on the Atlantic coast south of New York. In that period, records show, more than 100 sailing vessels frequently were in the harbor at one time. Appearance of the modern freighter at the new pulp mill dock has aroused visions of revived shipping activity. The Fernandina mill, completed by the Container Corporation last December at a cost of approximately $2,500,000 and dedicated in January before a crowd of 6,000 persons, including hundreds of guests from other states, is strategically situated for utilization of southern slash pine, which is delivered to the pulp mill by barge, truck or rail.

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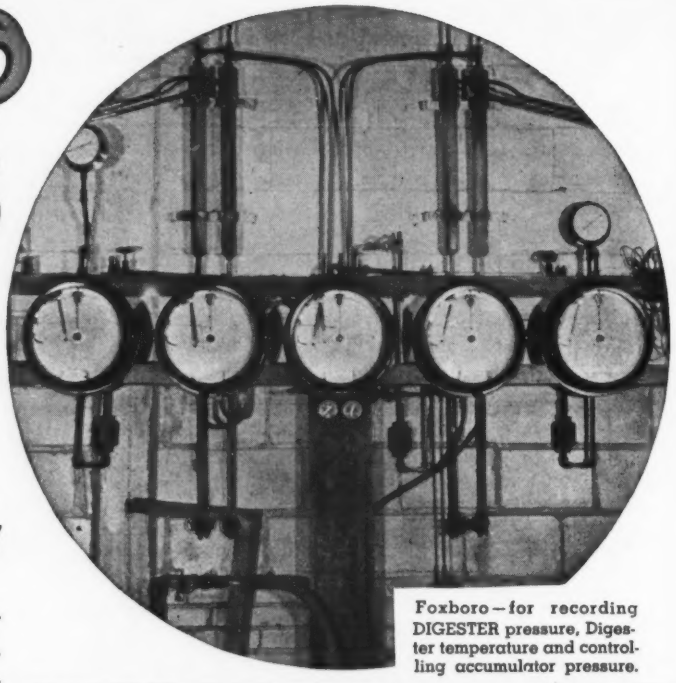

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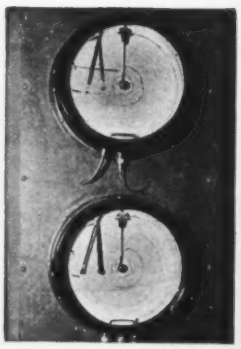
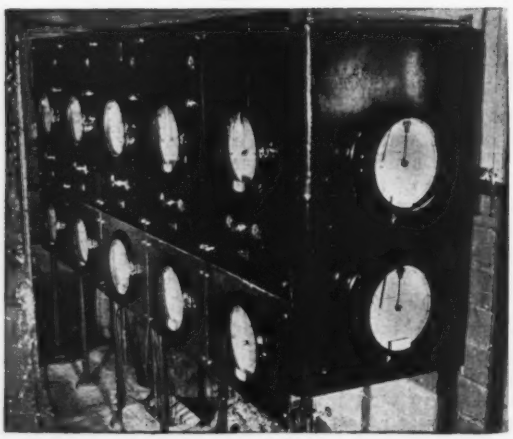
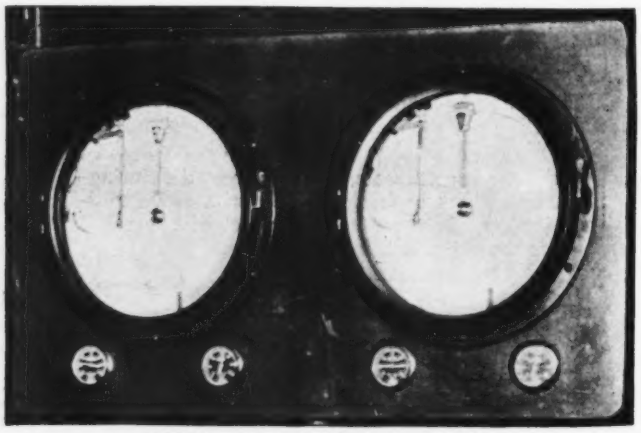


(Top) Foxboro HEAD BOX Level and Temperature Recorder. *(Bottom)* Foxboro Vacuum Recorder on COUCH and FLAT BOXES.

PAPER MACHINE control panel showing Foxboro Temperature Control on dryers.



Control panel on PROPORTIONATOR. 4 Foxboro Consistency Controllers, 7 Foxboro Liquid Level Recorders on stock tanks, and 1 Foxboro Pressure Controller, of white water to consistency control valves, are shown.



GRINDER control panel showing Foxboro Automatic Grinder Temperature Controllers.

COMPLETE PAPER MILL INSTRUMENTATION

Section of the
Technical Association of the Pulp and Paper Industry

Edited by Ronald G. Macdonald, Secretary

The Control of Variables on High Speed Newsprint Operation*

By Arthur J. Edward[1]

Abstract

Paper machines at the Dalhousie mill of the Canadian International Paper Company have operated efficiently and continuously at speeds over 1400 feet per minute.

This paper outlines the important points involved in attaining this speed, the technical data relative to stock quality and its running properties on the machines thus covering the variables involved, as well as other items of interest.

The most important phase in the production of any commodity is that it satisfy the consumer. The consumer in this instance is the publisher operating high speed newsprint presses. His requirements are exact in that the paper must be of such quality that it will run with a higher efficiency than heretofore attained as well as maintain this efficiency.

Such a requirement is a perpetual incentive to produce a better paper and this has been kept in mind when speeding up the machines at Dalhousie.

Every phase of production from the wood to the shipping room is important so this paper will start with a consideration of the wood.

Wood

Many of the problems encountered in a newsprint paper mill are due to variations in pulp quality. Operating conditions in the Groundwood and Sulphite departments may be the same as generally encountered except that a change in the wood has been noted.

This change generally refers to a variation in the percentage of spruce and balsam content of the wood supplied.

Mills operating with a high percentage of one specie are in a fortunate position in that small fluctuations of specie have little or no effect on the character of the pulp. However, in the case of a relatively uniform distribution of specie, pulp character is appreciably affected by a comparatively small fluctuation in the percentages.

The deduction is that the percentages of spruce and balsam do not make much difference in the operation of a plant provided that there is no change in the percentages or if a change is necessary that it take place very very gradually so that the change in stock quality and the accompanying paper making troubles involved can be smoothed out gradually.

The wood in use at Dalhousie is of local growth and is a mixture of balsam fir and black and white spruce which is furnished in the same proportions to both the groundwood and sulphite mills.

Pulp Furnish

The groundwood pulp carries the greatest responsibility in the drainage and formation of the sheet and general running conditions on the machines so extreme care is exercised to ensure the production of a uniform pulp of the required characteristics. A long fine fiber stock containing a minimum of coarse bundles of fibers is the objective so care must be exercised at the stones to ensure a uniform quality from stone to stone. To maintain this quality it should be needless to state that all mechanical equipment must be kept in the best of shape at all times.

Artificial stones are in use with a burr of 10-cut by 1½ inch lead.

The temperature of the stock in the stone pit is very important and is held uniform at 180 deg F. by means of special temperature regulator and recording equipment.

The control of Groundwood production is carried out on stock from the bull screens with a freeness on the Canadian standard freeness tester of 90 or slightly over being the objective.

This freeness figure had been increased from 75 to 90 as the machine speeds were increased as it was found that better operating conditions resulted, this increase reflected at the fine screens as well, where it raised from 50 to 70 with a corresponding slight increase in strength.

The groundwood after deckering and temporary storage passes primary and secondary regulators and is furnished the paper machine mixers in a uniform flow of 2.60 per cent consistency and 80 freeness stock.

The sulphite pulp is of a normal grade and is cooked by standard practice for a high yield with uniform quality, the grade being gauged by Roe-Gen-

* Presented at the annual meeting of the American Pulp and Paper Mill Superintendents Association, Royal York Hotel, Toronto, Ont., June 22-24, 1938.

[1] Superintendent of Technical Service, New Brunswick International Paper Company, Dalhousie, N. B.

berg chlorine number tests which fall between the limits of 4 and 6 corresponding to an average bleach consumption test of 24 per cent.

This sulphite is treated in temporary storage with alum and is then jordaned and furnished the paper machine mixers at a consistency of 2.33 per cent with 600 freeness.

Dry broke is jordaned and mixed with the thickened wet broke and then furnished to the paper machine mixers at a freeness average 141 and a consistency of 2.56 per cent.

The resultant mixed stock has a consistency of 2.53 per cent and a freeness of 141 and after thinning with wire pit white water gives head box consistencies around 0.58 per cent with a freeness of 40 for the production of 32 pound basis weight paper; this consistency is maintained approximately the same whether the machine is operating at 1100 or 1400 feet per minute with very little change in the wire pit white water consistency.

With increased basis weight and clay furnish the Head Box consistency will rise to as high as 0.75 per cent, a consistency secured for a 37 pound paper with a clay ash content of 6.0 per cent, and under these conditions there is a change in the consistency of the returning white water from the wire pit.

Sheet Formation

A publisher using high speed presses desires a strong, well formed and opaque sheet with a high smoothness or finish and the paper must be free from slivers, calender cuts, wet streaks and dirt.

The formation of the sheet is a very important factor with regard to its printing qualities. If the fibers are not laid down properly on the wire some fibres will stand on their ends and others will form clots and streaks and destroy the smoothness of the surface, its opaqueness and consequently its printing qualities, the inclined fibers tending to cause the trouble known as strike-through as the spaces left between them allow the ink to penetrate into the sheet.

The most perfect formation is where the fibers lie almost evenly on their side in a horizontal position in every direction so that they intermat and cause a uniform thickness throughout the whole sheet resulting in a high density and finished smoothness.

In order to secure this formation, the stock quality, its consistency, the head of the stock in the pond, its uniform flow onto the wire and the speed of the wire are all important factors, however, before these factors are considered we will discuss the other quality items.

The presence of slivers in a sheet is a reflection on the stock quality and can easily be corrected; dirt on the other hand is a considerably harder problem to combat due to the multiplicity of its sources; dirt showing up in the sheet may be specks of bark, dried pulp, oxidized bundles of wood fibres, sawdust, lime spots, undissolved alum, pitch particles, sand, clay, undissolved color particles, foam, slime of different natures and a hundred and one other substances. In combatting dirt a clean mill is the first requisite and probably the most important, next comes a clean wood furnish, the production of a uniform pulp whether groundwood or sulphite, proper screening control, the proper solution and straining of all furnish materials, regular periods for careful and thorough wash-ups, and proper treatment tending towards the elimination of slime.

The presence of calender cuts in a roll of paper in the hands of the publisher reflects immediately in improper inspection. The causes of calender cuts are many and varied and the corrective practice in one instance does not hold true in the next. A complete paper as long as this article could be written on the causes and various methods employed to combat the problem. Since there is no universal formula for its correction nothing more will be mentioned about it in this paper.

Wet streaks in the finished paper can be corrected and usually are by all manufacturers practically as soon as noticed.

The strength of a sheet of newsprint varies with several factors such as finish, calendering, dryness, formation, stock furnish and pulp capacity, practically all of which can be controlled.

For high speed newsprint operation we have found that the stock quality and consistencies mentioned near the first of this article serves best in securing the desired paper formation under present conditions in the Dalhousie Mill.

The head of the stock in the pond is the governing factor in the velocity of the stock discharge at the slice opening so that with increased speeds the head rises.

When a machine is operating at a certain speed the head of the stock will vary slightly with stock variations and will reflect in variations of basis weight and formation; variations due to other conditions arise from time to time so the use of liquid level recording gauges installed in the head boxes are of considerable assistance to keep the paper makers posted on varying head conditions. This is a good proposition at high speed production as a variation in head of one inch at 1400 feet per min. has a greater effect on the machine operating conditions than two inches at 1100 feet per min.

The head box can be a source of sheet formation trouble due to eddys, flocculation and the formation of lumps.

These troubles can be countered with baffles and perforated plates properly adjusted in conjunction with a positive flow of stock from the screens. A pressure on the supply of stock to the Bird Screens reflects in sufficient fan pump capacity and allows for the easy control of the flow of stock to the head box which travelling at high speed in the same volume from each screen does not mix in the head box, but flows straight through tending to eliminate eddys, flocculation or the formation of lumps. Under these conditions the position of the single baffle in the Dalhousie flow box is of considerable importance and its clearance at the bottom in conjunction with the perforated plates and flow eveners tends to slow down the flow without the formation of lumps so that the stock is in a suspension ideal for flow onto the wire.

Incidentally during the process of speeding up the machines the capacity of the bird screens was affected by their not functioning properly as the cylinders became flooded, coarser screen plates installed to maintain capacity allowed coarse stock to get into the sheet so all Bird Screens were raised sufficiently to allow for operation at a speed of 1400 f.p.m. basing the level of the center line of the screens on the theoretical basis that the hydraulic head should produce a velocity at the slice of 90 per cent of the machine speed. This change meant that everything back of

the breast roll had to be raised 17 inches and while this work was being carried out shower and tailings piping was replaced with brass instead of steel in order to remove a source of rust particles and to help in the prevention of slime growth.

A reduced consumption of fresh water in the showers was secured by renewing the shower pipes drilled with smaller perforations which also resulted in more efficient operation of the screens and eliminated an accumulation of stock lumps around the waste trays which were the cause of many breaks before this source of the trouble was found. The use of Sarco strainers on the fresh water supply lines to the various showers are effective in reducing wire damage and number of breaks.

Head Box

The head box is of wood in a fabricated steel framework which steel work was raised and slice extended 24 inches in order to provide for the additional head necessary for the increased speed and all wood and iron surfaces coming in contact with the stock flow were faced with copper sheet. This copper lining is very effective in discouraging slime growth and promoting cleanliness.

The head box is equipped with one vertical baffle, a sloping perforated plate and flow eveners.

The perforated plate is of brass with 1½-inch diameter holes on 2-inch isometric centers one edge resting on the hump ahead of the slice and the other on projections from the vertical baffle with a clearance so that it will raise or lower with the adjustments made in setting the height of the baffle. The flow eveners are of 16 stubs gauge stainless steel plates on 15/16 inch centers with solid bronze spacers which provide additional stiffness and a smooth flow surface easy to clean.

Special splash type showers were installed between the baffle and slice to wash down foam accumulations and prevent lumps of stock from adhering to the metal work.

Slice

A Van de Carr type slice is in use with the brass front pond plate sloping backward at a 60 degree angle from the horizontal while the hand screws for the lip adjustment slope forward 28 degrees from the vertical. Between the two a heavy I-beam was installed for a cross walk as well as to stiffen the slice and eliminate whatever deflection may be caused by pressure from the higher heads.

Considerable work on the semi-flexible cast bronze lip was carried out in order to make it flexible enough for easy adjustment and to allow for a smooth flow of stock out of the lip.

Several changes were made in order to determine the most effective setting of the throat in relation to the breast roll. The best conditions were found with the edge of the apron plate 5/32 inch above and 1⅜ inch back of the center of the breast roll, the lip open 9/16 inch and its edge 1½ inch back of the center of the breast roll with the center of the first tube roll 20¾ inches away from the center of the breast roll.

Fourdrinier Section

No improvements were necessary in the mechanisms of the fourdrinier section, however, provisions had to be made for the removal of additional water.

Water is desired in the stock so that it will carry over to the flat boxes and dandy.

Ideal conditions are obtained when the first two flat boxes and the dandy run wet and the third box runs moist. In order to do this it may be necessary to retard the drainage through the wire and the removal of tube rolls may be necessary.

The use of too much water in the stock results in quicker drainage with subsequent removal or wash out of fines from the sheet affecting the formation and the boxes will run dry which in turn affects the wire life and increases the power load; a similar condition exists when the stock is too free so the quality and uniformity of the groundwood reflects quickly at this point.

The Dalhousie high speed machine fourdriniers are equipped with a 26-inch diameter breast roll and 40-inch diameter suction couch, 20 tube rolls 10½-inch diameter on 13½-inch centers, eight suction boxes and a dandy. Several different types of wires have been tried with the result that a modified long crimp wire of 44 x 56 mesh 228 inches wide and 80 feet long was chosen as giving the most satisfactory service.

The fourdrinier has a pitch of 8 inches from the top of breast roll to the top of the couch. All eight suction boxes have end of grain covers with 9/16 inch diam. holes in 8 rows of 264 each.

It was found advantageous for water removal to increase the size of the suction box outlets from the original 4 to 6 inch diameter and to increase the openings in the box diaphrams so that restriction to the flow of water would be at a minimum.

The first two boxes handle most of the water so they are equipped with separate gravity water legs discharging into the excess white water pit below and develop a vacuum of 7 to 8 inches of Mercury. By-pass connections to the vacuum pump are available and are used for an hour or so on start up periods.

The other boxes are connected to a header which in turn discharges into a separater connected on the top to a vacuum pump giving 13 inches Hg. vacuum on the header.

With sufficient vacuum pump capacity and the desired sheet formation conditions as outlined previously a low moisture content of the web at the couch can be secured reflecting in a hard sheet with a reduction of stretch, quicker start-ups and a finished paper of better formation mullen test and tensile strength.

A dandy may become clogged with pulp and cause worm marks in the sheet or pick up marks with frequent breaks of the web at the wet end. They are washed out with a steam hose frequently and when badly clogged are removed and scrubbed with wire brushes and tenth normal sulphuric acid and again thoroughly washed. Such a practice will keep the dandys in good condition and extend the covering wire life considerably as well as result in a more uniform sheet inasfar as defects from this source are concerned.

The suction couch roll is perforated with 5/16 inch holes and contains an adjustable 8-inch suction box with micarta sealing strips which gives a vacuum of around 19 inches Hg. under operating conditions —located one inch down on this box and 8-5/16 inches in front of the center line of the couch a 16¾ outside diam. presser roll rests. The Presser rolls have a 1¾ inch thickness of rubber cover of 230

mm. plasticity. They are equipped with hydaulic lift devices controlled by hand valves for general operation, however, should the power go off the couch pump or couch motor an electric automatic valve is interlocked so that the roll will be raised immediately.

The function of the presser roll is to eliminate lump breaks by flattening out lumps before they reach the presses. For the best operating conditions we have determined that location mentioned above and a change from that position either up or down reflects in a short time in more breaks as the lumps are not rolled out properly. A small dribbling spray of water keeps the presser roll clean and stops the stock from sticking to it. The benefits derived from this equipment are a reduction in the number of wet end breaks with a corresponding increase in machine efficiency, a slight increase in the couch vacuum and a further hardening effect on the sheet which reduces lost time on breaks and allows for operation at higher speeds than could be obtained without it.

Presses

No changes were necessary for the first press equipment in the process of speeding up, but in the second press a 1 inch thick rubber cover of 25 plasticity was put on the suction roll, the holes in the shell being enlarged to 3/16 inch and the corresponding holes in the rubber made 11/64 inch. Better pressing and water removal was secured allowing for an increase in speed due to the decrease in moisture entering the dryers and felt life increased from 18 to 26 days. The presence of the rubber cover does not eliminate trouble caused by plugging of the holes of the suction roll, the rubber itself does not fill up, however, the bronze section underneath does necessitate the same frequent cleaning which we carry out periodically employing man power with punches.

Both presses are connected to a single No. 11 Nash pump giving from 17 to 20 inch Hg. vacuum.

Frequent attention is given to the levers and positions of weights in weighting the presses to secure the best operating condition at all times. Nip pressures on the first press with plain suction rolls are around 86 lbs. per lineal inch, while that on the rubber covered rolls on the second press are around 145 pounds per lineal inch.

The top rolls of both presses are couched forward 4⅜ inches and carry crowns of .095 inch compared with the plain bronze suction roll crown of 0.038 to 0.045 inch and the rubber suction roll crown of 0.091 to 0.096 inch.

The above data is included here to point out the necessity of proper pressing conditions to insure a uniform moisture content of the web entering the dryers which at high speed averages 68.5 per cent water.

In general any make of press felt will operate satisfactorily and when installed they are wet down according to the general practice. No chemical solutions are used for washing felts, in fact no washing of felts is carried out, however, occasionally a first felt may be turned if plugged up a bit on the surface. A new felt may cause a stickiness of the top roll which will persist for an hour or so, however, this slight trouble can be offset with kerosene oil.

A new felt also causes an increase in the per cent of moisture in the web entering the dryers by as much as 2 per cent reflecting an increased steam consumption, a condition which is quite noticeable when a machine has operated at maximum speed for a particular drying capacity prior to installing the new felt.

Driers

All of our machines operate without drier felts on the first seven bottom driers; a more uniform drying condition results with less wet streak trouble which can be actually created by long felts as well as a further improvement in the feel of the sheet which registers a tendency toward the reduction of harshness not otherwise secured.

Water cooled sweat driers and spring rolls in conjunction give a better finish to the sheet due to the condensed moisture entering the sheet at these points just before the calender stacks.

Calender Stack

Finish is secured with a 34-inch diameter bottom calender roll carrying a crown of .048 inch, a 22-inch diam. intermediate roll with a crown of .005 inch and six 16-inch diameter top rolls without crowns.

The intermediate and next two top rolls have water cooled journals, the next two top rolls are steam heated throughout their length and the two topmost rolls are plain.

The stack is ground at intervals of from 4 to 6 months depending on the development of chatter marks when noticeable on the reel when a favorable light is caused to strike across, thus ensuring a uniform caliper lengthways of the sheet.

Miscellaneous

The testing control of the finished paper can be carried out at the reel which tests include moisture, basis weight, mullen, caliper and density, which results can be immediately available while formation, dirt and smoothness tests and outturn samples should be secured from rolls after winding and prior to wrapping. Paper Inspectors responsible only to the head of the technical department should keep a record of cull rolls and the reason for same.

The presence of slime is a serious handicap to the efficient operation of any paper machine as well as to the quality of paper produced so it is essential that constant attention be given to its control.

After a system has once become polluted with slime it is a very difficult matter to sterilize it completely even during periods of extremely cold weather when the activity of slime growth is dormant.

Temperatures in the various parts of the system play a much greater part in slime activity than is generally supposed.

Slime accumulations develop with the first appearance of warm water or weather and for efficient operation must be controlled.

There are many different types of algae or fungi growths and bacteria which develop at different temperatures under different conditions which can be segregated and determined by careful bacteriological examinations and after a knowledge of the type causing the most trouble is determined proper treatment to overcome its activity can be instigated.

Actual culture has disclosed that no algae or bacteria enters the mill from the wood when subjected to the process treatments of the high temperatures in the groundwood and sulphite mills.

The source is in the fresh water supply and the presence of old slime accumulations in moist places such as seal pits, old flow boxes and piping; as the

temperature rises this infection spreads rapidly and will build up so fast in a closed system that troubles on the paper machines may be encountered within a week.

Treatment can include the use of copper sulphate, chlorine and chloramine, the spilling of white water, thorough wash-ups of screening systems and flow boxes with the removal of piping for cleaning with swabs of wire and high pressure highly chlorinated water and the boiling out of wet-end systems of paper machines with slime removing solutions.

The use of compounds of various salts is receiving attention at the present day in an endeavor to find a cheaper means of treatment for slime control.

Pitch may be a cause of serious trouble, however, our experience has been that with proper washing of the sulphite blow pits and the furnish of alum into the sulphite pulp entering temporary storage that most of the pitch is hardened and converted to a powdery form which passes over the machines without trouble.

Attention to the control of alum furnish is necessary in order to insure this condition as variations in the furnish are necessary at different periods during the year.

A systematic practice of securing pH tests and temperature at different points in the plant and noting the presence of accumu ations such as slime, pitch and foam will give an experienced observer a definite idea of troubles of various natures to expect and will place him in a position to be able to rectify them before they take place.

In closing, it is well to draw particular attention to the finishing, handling, storage and shipment of rolls of newsprint paper, which must be carried out in such a way that the paper will be properly protected and will reach the consumer in as good condition as when leaving the paper machines.

The Development Of The Art Of Trimming Paper*

By Howard M. Hubbard[1]

My sincere congratulations to President Millidge of the American Pulp and Paper Mill Superintendent's Association for this splendid, yet wholly comprehensive, dedication of American business ideals. This continent is getting to be quite a family, and I see no finer proof of its solidity than is demonstrated in this converging of forces toward a general betterment of pulp and paper mill operations, and a better understanding by superintendents of the problems common to all.

At this convention we will hear authoritative discussions on many different phases of your business. It is quite possible that no one person is sufficiently versed to discourse expertly on all of them, but through the collective knowledge of this group we should all absorb usable information on the practical and everyday problems of the mill superintendent and his staff. One of your problems—one of your sources of economy and profit—is the trimming of paper stock to size.

Importance of Accurately Cut Papers

The importance of accurately cut paper to the effective use of modern high speed printing equipment with hair line register, emphasizes the need of the most accurate cutting machines that money and engineering skill can develop.

It was formerly the practice of paper mills to divide large piles into smaller piles by hand—that is, a small lift of material was placed on a table, held down by hand and by hand also, the cutting knife was drawn through the pile. Needless to say, this procedure was extremely cumbersome but as a process represented that stage of mechanical progress which characterized the general level of industrial development of that period. It may be difficult for some members of this group to picture such a laborious procedure, but it is nevertheless a fact that at the turn of the century we knew comparatively little about automatic paper trimming equipment. Our field was one in which manual operations seemed destined to remain as standard. Straight lines were something born of human skill and machines were merely an adjunct to the keen judgment and trained eye of the craftsman. "Hand made" products were at a premium because "hand made" meant quality. It is altogether possible that the slogan, "hand trimmed" might have been even an inducement to the paper buyer. Even paper buyers might have suspected that through hand operations extreme care was exercised against any fallacy of mechanical operation, and that by purchasing "hand trimmed" stock he would receive even sizes and straight, smooth edges.

The Lever Cutter

Most of us know the next step in paper trimming —the lever cutter. Piles were held firm by a clamp actuated by a screw and hand wheel while the knife was forced through the stock by a hand lever. This method, although a definite improvement over the original hand procedure, was still but a step in the right direction. However, for years it was an accepted measure of modern progress and seemed, under the then existing business demands, sufficient and quite efficient.

Paper and pulp mills, at the beginning of this century, were not struggling so much for adequate production to meet a given demand as for new and more economical ways of making standard qualities. It must be remembered that a generation or more ago, the populace was not educated to the extensive reading that characterizes our modern living. Books

* Presented at the annual convention of the American Pulp and Paper Mill Superintendents Association, Toronto, Ont., June 22-24, 1938.

[1] Sec.-Treas., Harris-Seybold-Potter Company, in charge of the Seybold Division.

were printed, to be sure, and newspapers—but quantities were relatively small as compared with today's volume. People had less time and less inclination for casual reading. They also had, as I pointed out a month ago, a very definite opinion as to the plus value of hand made products. Books of the more distinguished type were hand bound, hand tooled and printed from hand set type.

Age of Education and Information

Then came what might be called the age of education and information. Paralleling the introduction of many labor saving devices in all lines of business and manufacturing came the desire to know more about the march of civilization. People felt the urge of twentieth century progress, the need to know more about it and the necessity of learning its tempo and of keeping pace with its constantly increasing speed. They began to search out the facts. They began to *demand* information, *printed* information as to what was happening. It was a siren call for more paper; it was a challenge to the pulp and paper mills to find ways and means of supplying it. They found themselves forced to turn away from the details of quality only and to bend their efforts toward larger output.

Chemistry found an open door and an opportunity to experiment with all the phases of paper structure; its elements were torn apart and through science put together again in patterns and qualities never before known.

Many of you gathered here were among the pioneering spirits who responded to the new demands by perfecting plant equipment. The coincident development and general acceptance of high speed printing equipment made the precision of cut sheets a matter of first importance. Without precision trimming at the mill, or elsewhere, accurate registry on these new fast machines was impossible. Inaccuracies meant waste, delay and loss.

Old Equipment Inadequate

Thus through the evolution of public requirements and the consequent development of the industry, the old trimming equipment became inadequate to meet the increasing demands made upon it.

For this new volume you needed, trimming equipment that would keep pace. Hand power was too slow, too expensive, and—for modern requirements—the old hand power trimming machines were also short on accuracy. A new eye-perspective had crept into the scene. What had always seemed the most accurate and of the finest quality—because it was "hand made"—suddenly revealed its inaccuracies. The human element was no longer the source of perfect results.

Any of us can realize the futility of trying to trim heavy lifts of mill sheets with a hand stroke cutter, at the high speeds which are demanded in our present production schedules. It would be equally difficult for us to imagine the accurate trimming and cutting imperative at the mill, to meet the tempo of modern press production were it not for the development of high speed precision trimmers. Modern machines have made us conscious of hair line and micrometer adjustments. With increased speed has come also increased quality—both the result of science and modern machine equipment. The pulp and paper mill of today is a typical example of modern industrial development because it has been the recipient of all that science and skill could contribute toward making its production adequate to the demands wrought out of this new tempo of the twentieth century.

The evolution of the mill trimmer has kept pace with industry's development. As the demand for greater volume appeared, so appeared the kind and type of trimming equipment which would keep the production lines open.

Hand Clamp Power Cutter

After the lever cutter came the hand clamp power cutter. This machine differed in the fact that the knife was driven by power. Even this improvement fell short of supplying all that modern production demanded. In the power stroke of the knife there *was* the element of speed, but the human element still failed to meet the growing need for accuracy. Mill executives were realizing that the term "hand made" was a phrase of idealism. What they needed was machine accuracy—something measured by the limits of hard steel—precision.

Paper, to be saleable in a market stimulated by new demands for both quantity and quality must include such characteristics as would effectively impress the buyer. It must satisfy a new perspective and new evaluation of accurate size and trim. It must be modern in the textures, weights and finishes calculated by chemical science to serve a modern taste. The first step in the demand for accurate size and trim obviously must be taken in the pulp and paper mill.

Hand trimmers, even hand clasp power cutters could not for the reasons mentioned do a sufficiently adequate job. To supply a volume market the trimming of rough piles could not wait for manual operations in so many of the steps.

Fully Automatic Cutter

Again the engineering department of the equipment manufacturer met the situation by developing a fully automatic cutter and in such capacities as to permit the trimming of a 94 inch sheet. These automatic clamp cutters required no manual operation other than the determination of the line of cut. All operations, after this determination was made, were automatic. The clamp was automatically compressed on the paper, the knife automatically drawn through the pile and both movements automatically returned to an idle position when the cut was completed. In speed the automatic clamp mill trimmer set a new standard. Only a few seconds were required to clamp the lift of stock and complete the trim.

With a skillful operator—that is, one who was deft in placing and removing material from the machine,—this automatic clamp mill trimmer had vastly increased production possibilities.

As is always characteristic of machine development and application, the continued experience on the firing line of mill and shop indicated new problems brought about by variations in paper stock, the length and depth of the cut, and combinations of other factors incident to progress in the graphic arts. Continued refinement of the basic machine has been the inevitable and necessary result. For instance, the provision for varying clamp pressures to meet cutting requirements has and still is receiving considerable attention. Modern machines are equipped with simple devices to increase or decrease clamp

pressures without loss of valuable time. The development of fancy and special papers added further complications through the irregularity of the piles, the quantity of air between the sheets and other similar trouble producing characteristics. Experiments at both the manufacturer's plant and in the field have produced numerous variations of the flexible sole clamp which serves to distribute a uniform pressure over a pile of irregular height. The problem of fluffy paper has been met in various ways including the use of clamps with wide faced soles. There is no general formula that will solve all trimming problems. Today, after our fifty years of experience, we continually meet new combinations of factors which can only be successfully handled as individual problems in machine application.

Automatic Back Guage

The basic advancement in mill trimming equipment did not stop with the perfection of the automatic clamp. In addition to this essential contribution to the modern production speeds, we have developed for the industry a trimmer equipped with an automatic back gauge. The initial applications provided for uniform automatic spacing by purely mechanical means. The scope and flexibility of the principle, however, were tremendously advanced by the introduction of the electric auto spacer which permitted automatic cutting at variable space sequences. The electric spacer is an excellent example of the transfer of skill from man to the machine. The operation of the machine from the standpoint of the operator is unusually simple. On an electric carriage, syncronized with the back gauge, are movable contacts which can be set in combinations of spacing according to the work to be cut. Once the stops are set, the auto spacer follows the sequence, forwarding the work automatically after each knife stroke to the next cutting position. The spacer bars are not only four sided but quickly removable and easily replaced with other bars. It is thus possible to preserve the bar set-ups for repetitive use where the nature of the work warrants such practice. As a matter of fact, the auto spacer has been generally acclaimed as the most significant advance in recent years in the development of cutting machines.

Along with the advancement of such features as have already been discussed, the efficiency, speed, accuracy and safety of the mill trimmer has also been enhanced by the increased use of properly dimensioned knives. No matter how carefully the trimming machine is built, the use of improperly dimensioned knives will, undoubtedly, cause inaccurate cutting. This is why we have always stressed the importance of using knives made to suit the individual requirements of the machine.

Increased Emphasis on Safety

The growth of mechanized industry has increased the emphasis placed upon the safety of the employee by both government agencies and industry itself. It has been our belief that safety is greater when built in all along the line of movement rather than as a guard at the point of operation. The sense of security in the operation of a safe machine contributes to increased production and more accurate cutting.

In the past, the success of both manufacturer and industrial consumer has been based on a close collaboration and whole-hearted cooperation toward the development of equipment adequate to the job it had to do. The problems of the future will doubtless be no less exacting and the far-sighted, forward-thinking manufacturer and user must work even closer for their mutual advantage. The industrial leaders of tomorrow, as in the past, will be those concerns which are today emphasizing the importance of research, pure and applied, and as a result of which will have obsoleted today's methods and techniques. You will find the alert producers of equipment eager to work with you on these vitally important problems. For many months we have been suffering from the deflationary pangs of a business recession and the character of the future is far from clear. For those, however, who have the courage, foresight, and financial resources there is an actual opportunity to capitalize the depression by "catching up" with our product, equipment and organization problems.

Urge Toward Higher Standard

There is a very definite urge throughout the world today towards the achievement of a higher standard of living for the rank and file of our people. The catastrophe of the war left the world in bankruptcy, economic and moral, and has given rise to the forces of discontent. The attempted solutions to these grave problems have been many and in recent years have been largely of a political character. Unfortunately, the economics of the politician are colored by personal expediency and tend in the direction of high wages, high prices and inflation. Such a course results inevitably in a declining standard of living for the people as a whole and if continued in some kind of an economic and social explosion. The real solution, however, would appear to lie down that more difficult road whereby costs and selling prices are reduced on a sound basis and as a result of which the real purchasing power of the people is steadily increased. In this direction, also, lies increased employment and a reduction in poverty and the breadlines.

Reselling Business

It may seem a far cry from the trimming of paper to a consideration of economic and social well-being, but I am convinced that we as industrial executives delude ourselves if we continue to divorce our thinking from these matters. The future character of the world in which we live and work depends in a large degree upon how effectively we adjust ourselves as executives, individually and collectively, to the changing character of current conditions and the thinking of great masses of people. We have unavoidably inherited the vital responsibility of reselling business to the people and to our own employees which will include among other things a continued effort to produce a better product at a lower cost to the consumer.

Must Pledge Cooperation

Under such conditions, cooperative efforts such as the meetings of this association take on an added significance. The trade press, likewise, has been and will continue to be a highly constructive force toward more effective industrial procedures. As manufacturers we pledge our whole-hearted cooperation toward the realization of this vital program.

A Comparison Of Modern Methods Of Coating Paper*

By Paul de Guehery [1] and E. G. Milham [2]

The manufacture of coated paper dates back to the invention of the half tone process of printing which practically demanded a paper having a smooth mineral surface. Of course when the demand for this type of paper appeared, the old time paper makers did the obvious thing. They mixed their mineral into a thin slurry, added enough animal glue to stick it to the surface of the paper and applied the mixture to the sheet with a white-wash brush, after which they air dried it and calendered it sheet by sheet. From here it was only a step to the invention of a mechanical painting rig which coated the paper in a continuous web and hung it up on a mechanical clothes line to dry. Crude as it was, this type of equipment, with minor improvements, has persisted until the present moment. As a matter of fact, the machine has offered so many advantages in the matter of quality and control that even today a very large proportion of the finest coated paper is made on brush coaters equipped with the socalled festoon air driers.

Festoon Driers

The advantages of this type of machine may be listed as follows:—

1. Good adhesion of pigment because the brushes thoroughly work the coating mixture into the paper.
2. Comparatively good control of the weight of the coating.
3. A wide range of coating weights is possible ranging from two to thirty pounds per ream on one side in one operation.
4. A wide range of type and characteristics of coating is possible.
5. Operation is simple and equipment cost is comparatively low.
6. Changes in grade, weight and color of coating are easily accomplished.
7. The paper in process is subject to close and thorough inspection while the machine is in operation.

The inherent disadvantages of this type of equipment are as follows:

1. The speed is very definitely limited by the difficulty of getting paper on and off the festoon rack at high speed.
2. The practical width of the machines is limited by the fact that high waste is entailed when a relatively wide sheet is dried on the festoons.
3. The equipment is not well adapted to the coating of paper which has a tendency to curl or pucker when wet.
4. The coating cost per ton as well as the waste increases very decidedly as the weight of the raw stock decreases.
5. The festoon rack is not versatile in the matter of range of raw stock weights which it can run with any given set-up, since, as the weight of raw stock varies, the diameter of the festoon sticks must vary in proportion. Light stock must be run on relatively small light sticks and heavy paper must be run on large sticks or else arrangements must be made to run multiple sticks. This of course involves mechanical changes in the equipment.
6. Brush coaters are not easily kept clean since they fill up very rapidly and cannot be cleaned on the run. Of course, as the equipment gets dirty, the quality of the product suffers somewhat. This entails frequent shut-downs for cleaning up, changing brushes, etc.
7. Brush marks, hair marks and color lumps are frequent sources of trouble.
8. If not properly operated, the brush coater has a tendency to rub up fuzz on the paper.

Brushless Coaters

In order to overcome a few of the disadvantages inherent in the brush coater, many experiments have been made with the aim of eliminating as many of the brushes as possible. The first successful attempts resulted in the adoption of a pair of applicator rolls to replace the cylinder brush for applying the coating to the paper and for regulating the weight of the coating. This development was followed with the introduction of a driven spreader roll to replace the socalled flat scrubber brush. From here it was only a step to the introduction of a series of driven spreader rolls to replace the rest of the flat brushes. This type of machine has definitely removed some of the disadvantages of the brush coater but at the same time has greatly decreased some of the latter's advantages. A few of the disadvantages of the roll coater may be listed as follows:—

1. The rolls are easily fouled and require frequent wash-up.
2. Close control of the weight of coating is difficult.
3. The operation and adjustment of the machine is by no means simple.
4. The versatility of the machine with respect to range of characteristics of coating is rather limited.
5. The range of weights of coating is very limited.
6. Generally speaking, the machine does not lay down as level a coat as a well operated brush coater.
7. The time required to change weight and grade is comparatively great.

The Air Brush Coater

The socalled air brush coater was developed in an effort to eliminate the speed limitations of the brush and roll coaters and at the same time to minimize the effects of fouling. The machine consists essentially of an applicator roll for applying an excess of coating to the stock and a flat air jet in the form of a blade for doctoring off the excess and leaving an absolutely level coating of the desired weight. This type of machine is said to be very efficient and versatile and offers no reasonable limitations so far as speed is concerned.

The high speed drier was developed as a matter of

* Presented at the annual meeting of the American Pulp and Paper Mill Superintendents Association, Royal York Hotel, Toronto, Ont., June 22-24, 1938.

[1] Michigan Paper Co. [2] Watervliet Paper Co.

necessity in order to gain the advantage of the high speed of which the coater is capable. Essentially, it is a straight line low tension drier which minimizes the drying time by enormously increasing both temperature and rate of circulation. The combination is said to do very fine work at speeds up to 600 feet per minute. The machine, apart from the high speed drier, apparently offers a very definite advantage in that it lays down a very uniform coat of very definitely controlled weight. In addition to this, the major aim of minimizing the effects of fouling was apparently realized to a rather large extent.

The essential disadvantages of the combination may be charged to the uncertainties and hazards of high speed drying. The successful use of the equipment involves a thorough and accurate knowledge and control of the multitude of physical and chemical factors involved when water is removed from wet coated paper at a high rate of speed. An exceedingly rigid control of these factors must be effected if the product of the equipment is to be uniformly satisfactory.

The Polished Drum Coater

A device of which coating men have dreamed, off and on, for the past thirty years or more consists of a large highly polished heated cylinder drier attached to the end of a coating machine. The paper is coated by any suitable method and placed with its coated side against the surface of the cylinder. In this way, the surface of the paper is moulded to the absolutely smooth surface of the cylinder and is ready for printing without any further calendering surfacing or polishing.

A modification of this machine prints or sprays a coating directly onto the surface of the cylinder and subsequently transfers the film, thus created, onto a moving web of paper. Of course, these machines are more or less in the experimental stages and we can do little more than take a very broad view of them here. However, the following comments may be made relative to their possibilities:—

1. It should be possible, with this type of equipment, to lay down a smoother surface than is possible with any other known procedure.

2. This equipment should produce a mineral surface practically flawless in its uniformity of character from point to point in the sheet.

3. The ink receptivity of this surface should be identical at every point in the sheet thus minimizing socalled mottle.

The Print-on Coater

Another recent development which is attracting more or less attention at the present moment is a machine which, in effect, prints a heavy slurry of pigment and binder onto the sheet. The machine may be operated as a straight coater in conjunction with any sort of drier; but it is well adapted for use with the conventional cylinder drier commonly used on paper machines. Since the speed of the coater is practically unlimited, it has been found feasible to incorporate the coater as an integral part of the paper making machine, thus making it possible to form, coat and dry paper at a comparatively high speed in a single operation. The advantages of this type of machine are as follows:

1. The cost of the coating operation per ton does not rise rapidly as the basis weight of the stock decreases, but within reasonable limits, is a straight line function of the weight.

2. If properly operated, the machine should give a comparatively low proportion of waste and seconds.

3. The cost of labor, power, heat and housing per ton of product is low.

4. Maintenance cost per ton is lower than that of the brush coater.

The disadvantages of the print-on coater may be listed as follows:—

1. The cost of installation and associated costs are high.

2. Changes in weight, grade and color are so expensive as to practically limit the field of the machine to the socalled production papers such as publication, special wrappings, etc.

3. In case the coater is an integral part of the paper machine, any trouble on the machine is passed on to the coater and vice-versa, thus adding to the expense of any difficulty in any part of the equipment.

4. The range of quality and weight of coating which may be applied satisfactorily by the machine is said to be rather limited.

5. The close control of quality and weight of coat is said to be difficult.

6. Generally speaking, the machine is subject to most of the hazards common to other roll coaters; especially with respect to ridges, ripples, streaks etc. in the coating.

The Flow-on Coater

Strictly speaking, this machine is not a coater since it does little more than put a thin film onto the surface of the wet web as it passes over the wire of the paper machine. Essentially the machine consists of a feeding roll and slide mounted in an easily variable position over the wire section of the paper machine. The coating material is picked up out of a trough by means of a separately driven feeding roll whence it is scraped onto the slide by a suitable doctor. The slide is provided with a series of ripple-breaking flutes at its lower end and is so arranged that the thin stream of coating material coming from the feeding roll may be made to slide down onto the paper at exactly the same speed at which the wet web is travelling, thus eliminating all tendency to distort or scuff the wet sheet.

Of course, this machine, like the polished drum coater is still in the experimental stage but it offers some exceedingly interesting possibilities in the matter of light weight coated wrapping and label paper and the like.

Summary

To summarize the above, we may make the following generalizations:

1. The six illustrations given above do not by any means exhaust the developments which have been made during the past ten years; however, it is believed that, as types, they very well cover the field.

2. At the present moment there is no indication that the newer machines will soon supplant the old conventional coaters, crude as they are.

3. Even with all these developments, the room for improvement is still great.

Recovery Of Heat And SO_2 Gas In The Sulphite Pulp Industry With Or Without Heat Exchangers*

By C. Rosenblad[1]

The author has during the last years had the opportunity of designing and building several plants for an efficient recovery of sulphur and heat for Scandinavian Sulphite mills.

When the question of heating acid has been discussed, the opinion has been somewhat divided in regard to the best method of heating the cooking acid. The author, who is the inventor and manufacturer of a highly efficient heat exchanger has on account hereof made a thorough study of the indirect heating system for acid. It goes without saying that a useful cooking acid of reasonable strength and temperature can be obtained regardless of which method is used. If an acid strength corresponding to 4 per cent total SO_2 and a temperature around 95 to 105 deg. F. (+35 to 40 deg. C.) will suffice, there is no necessity to use any arrangement for keeping the acid under pressure. If, however, a strength of about 6 per cent to 7 per cent SO_2 and a temperature of about 165 to 175 deg. F. (+75 to 80 deg. C.) is required, it will be necessary to use comparatively expensive arrangements in order to keep the acid under pressure.

The Importance of Strong Acid

The object of using acid of high strength and temperature is:

1. Better penetration of the chips.
2. Decrease of the cooking cycle.
3. Decrease of the screenings.
4. A more even quality of pulp.

These facts are well-known from literature. It is sufficient in this connection to refer to Saunderson and Maass publication printed in the Canadian Journal of Research 1933 from which I quote:

"The rate of penetration of sulphite liquor is greater at higher concentration of the free sulphur dioxide. This increase in rate with sulphur dioxide concentration becomes more noticeable at higher temperature indicating that at least a part of the effect is due to cooking action."

That the above statement is correct has been proven in actual operation. In a sulphite pulp mill in northern Sweden, a recovery system has been installed and due to the installation of the system, the strength of the acid could be increased from 4½ to 6 per cent and the temperature when charged to the digester increased from 92 deg. F. to 150 deg F. (+35 to 65 deg). Further there was an increase in yield of 3 per cent depending thereon that the screenings were decreased to a minimum. Simultaneously a saving of 10 per cent sulphur and 20 per cent of steam consumption for the digester was obtained. Incidentally it may be mentioned that the disadvantages which might occur when cooking with acid of high temperature due to air enclosed in the chips can easily be avoided if the chips are steamed before charged to the digester. If the steaming is arranged in a proper manner in connection with the chip filling, a higher yield could be obtained from the same digester. No time loss will occur if filling and steaming is done simultaneously. A further saving in time is obtained by this treatment because the heat injected in the chips during the filling will substitute some of the heat which otherwise has to be added to the digester during the cooking period. Real good digester circulation has also proved its great benefits.

Different Method of Acid Heating

Most pulp men are today convinced of the importance of using strong acid at high temperatures. Opinions, however, are divided regarding the means of obtaining strength and temperature. From heat engineering points of view, there are two lines from which the object could be obtained.

The Direct Method

The direct method is characterized thereof that the increase in strength and temperature of the raw acid is accomplished in several steps by means of injecting the relief gases into the acid directly from the digester without any intermediate cooling of the gases. The gases from the low pressure relief are injected to the cool raw acid by means of an injector or an absorption tower. After this first treatment, the acid is taken to a pressure tank. Into this tank gases are injected which are relieved from the digester in the pressure range of from 4 to 2 atmospheres. From this pressure tank, the acid is finally pumped to a high pressure tank. Relief gases escaping from the digester at full pressure down to about 4 atm. are injected into this tank (the figures given above are examples only and do not necessarily refer to actual conditions).

The system is characterized by big acid tanks. Comparatively high pressures have to be used and further the relief time will be long if the sulphur is to be effectively recovered.

From the description given of the direct method, it is easy to understand that it is hard to regulate the temperature and the concentration of acid, as by using this method the heating and increase of strength takes place simultaneously.

The Indirect Method

The indirect method is characterized thereof that the acid is concentrated to full strength in cool condition by means of cooled gases from the digester relief. The cool acid which has been concentrated to full strength by said cooled gases is thereafter heated indirectly by means of heat liberated when the

* Presented at the annual meeting of the American Pulp and Paper Mill Superintendents Association, Royal York Hotel, Toronto, Ont., June 22-24, 1938.

[1] Rosenblad Patents Company, Stockholm, Sweden.

digester is relieved and blown. It will be noted that according to this method, the concentration of the acid and the increase in its temperature is accomplished independently in two different steps. This method has the advantage that the acid is not exposed to any pressure during the concentration period. No pressure tank is required during the concentration and the relief of the digesters can be accomplished without any interference from back pressure. A further gain is that a higher concentration of acid can be obtained in cool condition without any losses of SO_2 than if the acid were hot. The SO_2 gas absorbed by cool acid can be kept in the acid when heating it to the final temperature at a considerably lower pressure than if the concentration and heating had taken place simultaneously. This is due to the known fact that the relief, besides the SO_2, contains inert gases. Some of these gases are CO_2 which decreases the absorption capacity of the cooking acid for SO_2. Even if laboratory tests show that it is possible to heat acid of about 4 per cent SO_2 strength to about 135 deg. F. (+57 deg. C.) without any loss of SO_2 at atmospheric pressure, experience from actual operation shows that the temperature under corresponding conditions can not be increased above 105 deg. F. (40 deg. C.) without loss of SO_2 if the digesters are relieved directly into the acid tank.

Acid Temperature and Pressure

TABLE I

No.	Temperature deg. C.	SO_2	Pressure kg./cm.
1	25	1.2/4	0
2	40	1.3/5	0
3	45	0.9/4.1	0.1
4	60	1.0/3.7	0.3
5	60	1.0/3.5	0.6
6	65	1.0/5.0	1.7
7	70	1.0/4.5	3.0

Table No. 1 shows acid concentration temperature and pressure in 7 different Scandinavian sulphite pulp mills. In plants 4 to 7, the acid has been concentrated in cold condition and thereafter heated directly. In 4 and 6 the complete gas absorption has taken place in cold condition which is the reason for the corresponding lower pressure than in the cases of 5 and 7 where part of the relief has been taken direct to the pressure tank. The table shows that it is possible to obtain an acid temperature of 158 deg. F. (+70 deg. C.) at a strength corresponding to 5 per cent SO_2 without exceeding 30 lbs. gauge pressure in the acid tank. If the system for *indirect heating* of acid is intelligently arranged, it is possible to work with a comparatively low pressure up to this temperature.

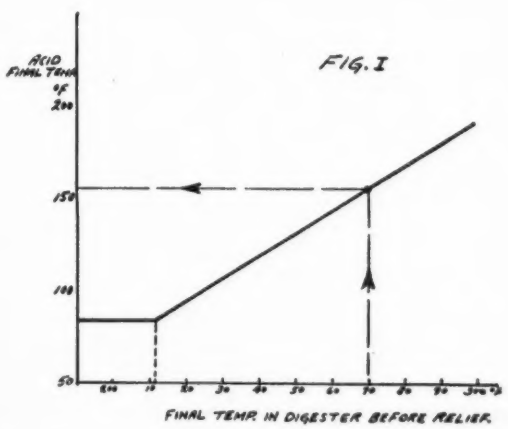


FIG. 1.

From heating engineering points of view, it is important to increase the acid temperature as much as possible by means of recovered waste heat. The amount of heat which can be recovered is dependent on the final digester temperature and by the water equivalent of the digester contents.

Referring to Swedish conditions, where the digesters are relieved down to atmospheric pressure with a simultaneous withdrawal of the liquor before the stock is dumped into the stock chest (more or less according to the Mitscherlich method), there will, of course, always be some free SO_2 and heat above 212 deg. F. (100 deg. C.) left in the digester when the dumping of the pulp starts. According to American practice, where the digester is blown from a comparatively high pressure, practically all SO_2 and further, at least theoretically, all heat above 212 deg. F. (100 deg. C.) can be recovered and used for heating the cooking acid provided of course that no cool water is injected when the blow takes place.

Fig. 1 shows a diagram indicating which acid temperatures can be obtained as a function of the cooking temperature when all heat in relief and blow vapors are utilized. The starting temperature of the raw acid has been assumed to 85 deg. F. (+30 deg. C.) cooking acid to 2340 imperial gallons per ton of pulp, the water equivalent to 24,700 B.T.U. per degree Fahrenheit and ton of pulp.

As can be seen, it is impossible to obtain a final temperature of the acid higher than about 156 deg. F. (70 deg. C.) (at a cooking temperature of 270 deg. F.) (133 deg. C.) without using other heat sources than relief steam and blow vapors. If a higher acid temperature is desired, it is necessary to apply fresh steam.

At this acid temperature, the question regarding digester heating arrangement presents itself, whether or not the acid temperature shall be increased in the digester or additional heat shall be added indirectly by means of a central acid heating system.

From heating engineering points of view, it is advantageous to advance the acid temperature in a central plant by means of live steam to as high a temperature as possible because in this way, a considerable decrease in heating surface will be obtained. The heating surface in a central acid heating plant can be utilized up to 100 per cent of the time and continuously at full capacity. The heating surface connected to each digester is utilized maybe only 60 per cent of the time and an average at only 50 per cent capacity. The "Utilization factor"[2] is in the latter case much less. Thus the upper limit of the acid temperature before entering the digester is therefore only determined by its effect on the pulp quality. Some pulp men claim that 165 deg. F. (74 deg. C.) should not be exceeded. Others claim that the acid could be heated up to 215 or 230 deg. F. (102 to 110 deg. C.) Regardless of the final acid temperature, it is important that the acid heating be done according to a method where an unnecessarily high pressure is avoided.

[2] Paper presented during the World Power Conference in London.

Description of a Plant for Indirect Heating of Cooking Acid

Fig. 2 shows diagrammatically the indirect method for heating the cooking acid as described above, using the Rosenblad blow steam condensing plant in an American sulphite mill. From the raw acid tanks at the left on the figure, the concentrated acid is pumped to the condensing plant shown in the foreground of the picture and the pressure acid tank. Part of the acid is taken through the relief cooler, and heated in the same to the desired temperature by means of the heat contained in the relief gases. The balance of the acid is heated in the spiral heat exchanger in the condensing plant to the desired temperature.

In regard to the blow steam condenser plant some arrangements have recently been changed giving particularly good results. The whole quantity of cool condensate to the jet condenser is first pumped through a gas cooler of indirect type where the condensate is preheated some 20 degrees. Thereafter, the condensate is finally heated in the jet condenser to about 185 to 190 deg. F. Using this method of heating the condensate in two steps, the temperature regulating problem has been solved in a very satisfactory manner.

The SO_2 gases which have been cooled in the condensing plant and relief cooler are taken to raw acid tanks and used for strengthening this acid which takes place in an absorption injector. The words "raw acid tank" are not quite correct as the content of this tank is acid of full concentration. The volume of this tank should be ample in order to avoid variations of acid concentration, with consideration given to intermittent blowing.

The pressure acid tank, however, must not necessarily be made larger than what corresponds to the difference in filling time of the tank and the digester. This tank is filled continuously with ready made acid of desired concentration and temperature. All temperature and concentration changes are completed *before* the acid is taken to the pressure tank. This involves a principal and important difference between the direct and indirect acid heating system.

FIG. 3.

Fig. 2 refers principally to Scandinavian installations. The difference between this plant and the American plant is that the vapors going into the jet condenser here emanates from flashed liquor instead of vapors escaping from the blow pits.

Fig. 3 shows a similar installation from a Swedish pulp mill where steam flashed in the waste liquor tank at the left leaves through the heavy pipe from the top and goes to the vertical jet condenser. The jet condenser is at the lower part connected to the

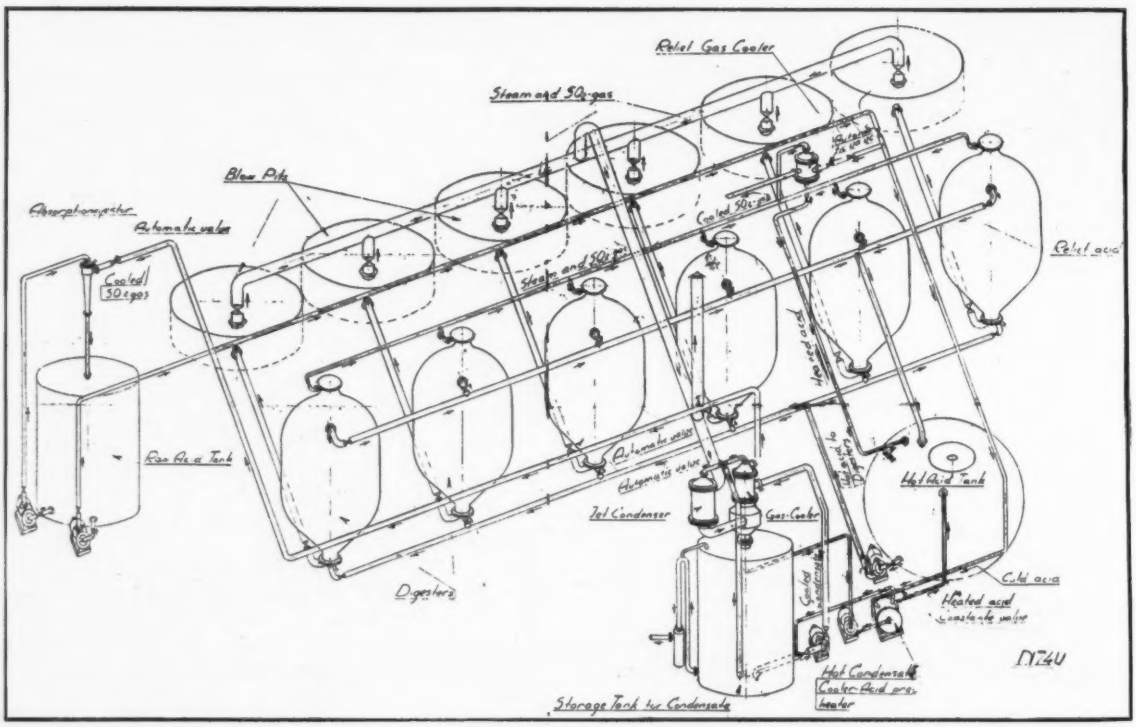


FIG. 2.

wooden accumulator tank for hot condensate. On top of this accumulator is an indirect gas cooler of spiral type. At the side is the heavy connection for cooled SO_2 gas and at the top is a smaller pipe for heated water going to the jet condenser.

Behind the accumulator is a small building in which the pumps, the spiral heat exchanger and the regulators are installed. This is shown clearly in Fig. 4, which shows installation from the opposite side. Fig. 4A also shows the horizontal gas pipe connection to the absorption injector on top of the raw acid tank to the right. Acid is pumped from the bottom of the tank through the vertical pipe to the top of the injector and leaves with increased SO_2 content through the vertical Y shaped pipe into the raw acid tanks.

In this plant, a discarded sulphite digester is used as pressure tank for acid. A volume of this tank corresponding to the volume of one digester is probably the minimum in a digester house containing 10 digesters but an increase of 10 to 15 per cent of this volume would probably be desirable. However, the recognized margin is very much less than what actually is necessary if a direct acid heating system was used according to experience from actual operation.

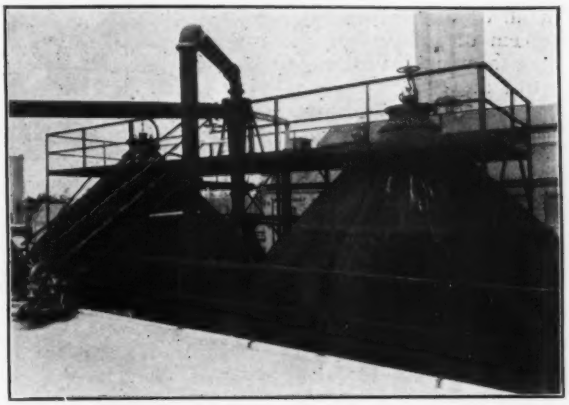


FIG. 4A.

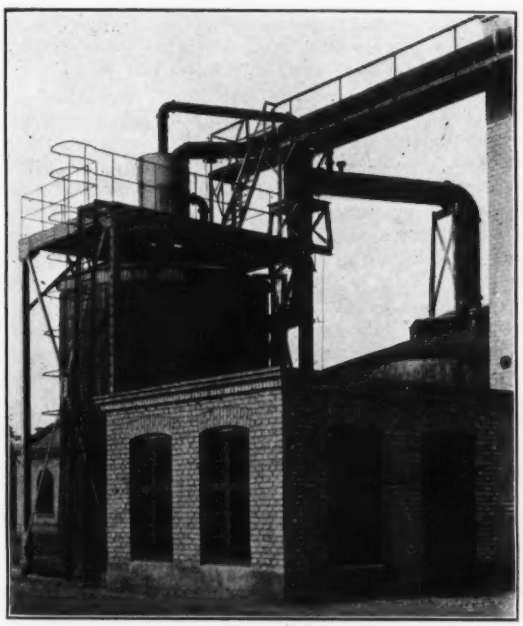


FIG. 4.

If the question of saving time is of minor importance, it is possible to completely eliminate the acid pressure tank and substitute this tank by a larger number of heat exchangers in the heat recovery plant in order that the whole acid quantity could be heated to the desired temperature during the time required to fill the digester. The cost of a pressure tank corresponds to the cost of a very large heating surface. For several pulp mills the substituting of the acid pressure tank by spiral heat exchangers has been shown to be most economical.

The two different methods for obtaining a strong acid at high temperature, direct or indirect heating, has been treated contrary to each other. The combination of the two is naturally possible and many such combinations are used at different plants. However, it is probably impossible to make such a combination without jeopardizing the quality of acid or the top result from the indirect heating.

The Development Of Modern Wage Incentives*

by Alexander Strong[1]

The development of wage incentives as a more scientific means of exercising an intelligent control over labor costs, has covered a period of 25 or 30 years. How far back the use of simple piece rates goes, is not, as far as we know, a recorded historical fact. It is probably true, however, that up until the time of Taylor and Gantt, such piece prices as were used were crudely set, and were used primarily for the purpose of limiting a direct cost at a definite figure.

The introduction of the principles of "Scientific Management," however, represented the first really intelligent and constructive approach to the wage problem, as such, and should undoubtedly be credited with the origination of all modern time study. Clumsy as Taylor's clerical records may seem today, by comparison with present practice, they were the first attempt to analyze production records for purposes of control of labor costs, and undoubtedly started Management thinking constructively about the whole problem of elimination of idle time as a serious item of cost.

Since the advancement of that original idea there have been many "systems" developed, some very simple and some quite complicated, each with its particular advantages for some particular condition,

* Presented at the annual convention of the American Pulp and Paper Mill Superintendents Association, Toronto, Ont., June 22-24.

[1] Rath & Strong, Inc., Engineers, Boston, Mass.

but all of them attempting to solve the same basic problem of elimination of waste time through the use of a money incentive to the employee. The success of these various methods has varied, depending principally on three factors: Effectiveness of its presentation to the employee; adaptability to different conditions; and the relative accuracy of its basic information.

Of these major items, effective presentation of any wage incentive to the employees who are going to work under it, is the most important and, especially under existing labor conditions, the most difficult. Not only must the rates that are set be fair, but the individual who is to use them must be convinced that they are fair. This calls for a quality of salesmanship that surpasses any commonly known variety of that craft. Far from being of the high-pressure kind, it must be quiet, modest, and sincere, and depends for its success on the establishment of a mutual respect and friendship between the time study men and the individual employees. Obviously, this requires not only personality, but a genuine understanding of, and sympathy for the employee's point of view. The day of the studious looking clerk with the shell-rimmed spectacles as a time study man is finished. Today, to be really successful, that man must not only have enough education to do the technical end of his job, he must also have some mill or shop experience, and be able to talk to the people in the plant in their own language and about their own problems. This calls for a distinctly higher calibre man than often has been, and still is frequently used. In our experience, it is a prerequisite to any really worth while accomplishment in the establishment of effective wage incentives.

The question of adaptability, or flexibility in adjusting the method of control to varying industrial problems, has been the most easily solved, and today practically all of the well known wage payment systems can be fitted to almost any production problem.

The third factor of major importance is the accuracy of the basic information. A time study man is first of all an observer. He must get the facts and then properly evaluate them. This sounds like a simple matter, but it is not always as easy as it sounds. The old method of setting piece rates, even by time study, was to take an over-all time for several, or perhaps several hundred pieces, add some percentage factor for delays, and multiply by a money factor. Under this method, it is almost, if not entirely impossible, to give proper consideration and weighting, either to the variables which may have occurred in the job, or to the kind of performance given by the operator while being timed.

Continuous Timing Necessary

Consequently, in order to minimize the chance for error, and to give a better opportunity to determine the cause of variables, modern time study methods require that continuous timing be done, not only by individual pieces, but frequently by individual elements of work on each piece. Until one has tried it, it is difficult to believe to how great an extent this procedure will clarify the reasons for varying performance. For example we are frequently asked how it is possible to set a correct rate when an operator purposely slows down on a job while being timed, especially if we are not thoroughly familiar with the job ourselves. It may be unconvincing to the uninitiated, but it is a fact, that an experienced time study man, if he takes an element time study, can recognize a "stall" as easily as he can the noon-day sun. He may have great difficulty in determining the percentage of regulated slowness arranged for his benefit, but he can not be fooled about the fact that it is going on.

It was probably the realization of what the pursuit of the "element" idea might lead to, that really opened up the whole subject of rate setting to scientific analysis, and has brought the study of control of all labor costs to its present state of development.

The most significant fact that becomes apparent through a comparison of a careful time study and the production actually turned in on the same job, is the wide discrepancy between what seems to be possible and what has been obtained. Seldom in our experience have the two figures been the same, and the answer, when it is found, will generally prove to be the answer to the whole problem of excess labor costs—avoidable lost time.

Since even the crudest time study will disclose discrepancies such as indicated, it used to be almost universal practice in setting piece rates to make an allowance to cover delays, on the assumption that they were an inherent part of every job. The break-down of a study into its elemental times, and the analysis of these figures, including not only unavoidable losses and interference, but fatigue as well, now makes it possible to take the guesswork out of the delays, and to set an allowance of time for any given job that no longer includes blanket coverage for all losses, whether avoidable or not.

When this is done it becomes, for the first time, a provable fact that time is being lost for some reasons that are not inherent in the work. If this loss can be eliminated, not only will greater production be obtained, and some money be saved, but the employee himself will have an opportunity to increase his earnings. Consequently, the best modern practice carries as a part of the wage incentive plan some definite and positive method of recording avoidable losses of time and of eliminating their causes when they are found. When this is accomplished, it becomes obvious that savings which may be realized are not due primarily to greater speed of the worker, but principally to maintenance of his normal rate of performance over the full day, rather than intermittently over the same period, but actually during fewer hours. An appreciation of the fact that the average person normally works at a perfectly reasonable rate of speed, and that it is increased steadiness rather than increased rate that actually increases production, is essential. It is for this reason that individual daily production can be stepped up, often enormously—without fear of collapse of quality. As a matter of fact experience has proved in countless instances that the closer attention required by steady rather than intermittent work, has resulted in a definite improvement in the quality of workmanship.

The problem in the control of excess labor costs therefore becomes one of analysis as to the causes of the excess, and the means of its elimination. Any wage incentive plan, if it is to be more than just a means of paying labor, must take these facts into consideration, and provide a method for handling them. In our own experience we have found the most practical method to be the recording, at the time of their occurrence, of the amount and nature of all delays which are beyond the control of the individual oper-

ator. With this factual record, an analysis can be made either daily or weekly of the kind and causes of interruption to production. The operator can be given proper credit for time lost, when it is lost, rather than in a blanket allowance; Supervision can be shown its own responsibility for delays, and penalized or rewarded according to performance; and Management can intelligently judge the capability of its organization and plan for the eventual elimination of important items of interference.

Piece Rates and Time Standards

There has been for years disagreement among engineers as to the relative advantages and disadvantages of piece work and time standard systems. While there are many actual differences according to the methods of application, the one essential fact is that in one case the employee is given his rate in money, and in the other in time. In the latter instance a money value is of course attached, but it is generally expressed as an hourly rate of earnings rather than as an amount per piece. There is in our opinion one real advantage to this in that when wage levels change, a change in hourly rates is all that is necessary without affecting the time standard, whereas with piece work rates, they all must be changed, and in the case of decreases the employee feels that he is being compelled to do more work. In one case the rate of pay is being lowered whereas in the other the amount of work is being increased. Of the two the latter is, if anything, less popular with the employee. With the exception of this point, there need be no difference in the essentials of control which can be obtained with either type of incentive, although it is generally true that the piece work installations are less carefully set up and are used only as a basis of wage payment. We ourselves have used both methods at different times and under different circumstances, with equally good results.

One of the most recent developments has been the carrying of the "element time" idea to the point where satisfactory coverage can now be obtained on non-repetitive work. For many years it has been conceded that most straight line production work can be successfully timed and covered with rates for payment on the piece basis. On the other hand, it has been an equally accepted fact that work of a non-repetitive nature was not susceptible to such measurement. Engineering analysis has now demonstrated, however, that even work of this nature is generally composed of repetitive elements of work, and the determination of time values for these makes it possible to estimate standards in advance of performance, provided only it is known what work has to be done.

This development, while still comparatively new in so far as its application is concerned, opens up a tremendous field for the control of the more elusive labor costs, such as on maintenance and repair work, the making of tools and patterns, and other such types of labor, the cost of which is notoriously high. It has been demonstrated in the last two years that, by using this method, practically all the work in the average tool room involving the making of jigs, fixtures, dies and tools, and the manufacture and repair of machinery, can be covered with correct and consistent rates through the use of basic elemental times in estimating from blueprints. The same procedure can also be followed in covering pattern making and pipefitting, welding, carpenter work, and many other types of plant maintenance.

Another development of the same fundamental principle is in work now being done by technicians on motion study and motion time analysis. While at present the field of application of this work may seem limited, it has unquestioned value, and the strides that have been made and are being made in the field of industrial engineering are so great that it would be foolish to make any predictions about impossibilities in the future. Progress in any line is made by research, experiment, and experience, and depends on the vision, tenacity, and ability of individuals. Intelligent analysis and persistence have demonstrated in this field, as in all others, that eventually the answer can be found to almost any problem.

Application to Paper Industry

In considering the applicability of the various principles which we have been discussing, to the manufacture of paper, there are two thoughts that will immediately occur: First that many of the finishing operations like cutting, sorting, and wrapping are similar in their nature to hand and machine operations in other industries, and might therefore lend themselves to the same type of measurement; and second, that the operation of a paper machine and its auxiliary equipment is so different from anything else that the same ideas would not be applicable at all. Both of these points we would like to discuss in more detail.

It is axiomatic to industrial engineers that, given the right incentive, any individual will do anything of which he is mentally and physically capable. The problem is to determine the right incentive. It might also be added that it is sometimes something of a problem to determine just what it is that you or the management really want the individual to do. That may sound like a ridiculous statement, but we had a case once in which we were attempting to set rates on a certain inspection operation, and when we asked the management what constituted good quality on that particular article, they stated that they had five experts, no two of whom could agree as to what was good quality. It seemed fairly obvious to us that it was more or less futile to ask about two hundred girl employees to inspect accurately to a quality standard that was so elusive that not even the experts could decide what should be passed and what rejected.

That did not happen to be in a paper mill, but at the same time I seem to remember several arguments about whether a certain run of paper would get by with a certain customer or not. The point of it all is, however, that before correct rates can be set on any job, it is necessary to have definite specifications as to what the work of that job is. In the case of most finishing operations this is not difficult, and consequently we have often set rates on sorting, counting, wrapping, and packing operations, without much difficulty and generally with excellent results. There is no rule about what gains can be obtained through the application of up-to-date wage incentives to this type of work, because it all depends on what performance has been in the past. The opportunities do not differ materially from those existing on hand work in any industry. In general, we find that elimination of avoidable losses will permit increases in individual production on hand jobs, of from 30 per cent to 100 per cent, and naturally the amount of this opportunity will determine both what the company can save and how much increase in pay the employee can earn.

In the case of some other finishing operations such as cutting and calendering it is neither as simple to set correct rates nor as easy to get results. The fact that machine speeds are a limiting factor, rather than the performance of the individual, prevents as a rule any such percentage increase in capacity as is the case on some hand jobs. Nevertheless, the regulation of the job in terms of the machine, rather than in the capacity of the individual to serve it, may still frequently leave substantial opportunities for decrease in labor cost. It is a somewhat more complicated process to determine the extent of the individual's ability under such circumstances, and to provide him with an opportunity for full utilization of his time, but here again analysis of the facts followed by good supervisory planning is generally followed by a very satisfactory improvement.

It is when we come to the operation of the paper machines themselves that all previous theories about the measurement of individual performance seem to break down. In the first place, it is obviously impossible to measure the work of any individual member of the machine crew in terms of the product, and in the second place, one only has to see it once to realize that when the entire crew is working at top speed the machine is not making paper, and vice versa. Under such circumstances one has to revert to fundamental principles to determine whether any incentive at all is possible. In other words, what is the objective of the operation? Obviously, it is to make as much good paper as possible. It is equally obvious then that if any incentive is to be set, it must be set on just that objective, and nothing else. But if, when the machine is making good paper the crew has little or nothing to do, how can an incentive be set on the work done by the men? The answer, of course, is that it can not—at least directly.

Purpose of Incentive

This again leads back to fundamental principles, as to just what is the real purpose of the incentive in the first place. Is it to get the individual to do more work in the physical sense, or to get more work accomplished in terms of the product? A study of this question will lead to the conclusion that, whereas in the case of the hand job the two definitions are practically synonymous, that is not always so, and certainly not in the case of the paper machine, and that, as a matter of fact, the second definition is the correct one. We therefore see that, if this kind of work is to be covered, it must be done by the method known as a "process application" and that the rates must be set for the crew as a group, in terms of the quantity of good paper made, and the standards must be determined by the capacity of the machine on the various grades, rather than on the capacity of the individuals to perform work.

On this basis it becomes impractical, under normal conditions, to attempt to make any reduction in the number of men in the machine crew, even though much of the time they may be doing no actual work, and consequently no direct labor saving of any consequence is obtained. Actually if the hourly cost of operating a paper machine is figured, including all such items as power, steam, interest on the investment and depreciation, it will be realized that, of the total, labor cost is one of the least important, and the most vital factor in economical operation is to get a greater volume of good product over which this heavy overhead can be distributed. This is exactly what has been accomplished in a number of instances, for it is a fact that we have on different occasions seen increases of from 5 per cent to 12 per cent in the production of good paper, obtained consistently through the use of a group rate based on machine capacity. You paper manufacturers, who are familiar with your hourly operating costs, can figure for yourselves what it would mean in dollars and cents saving if you could distribute this cost over, say, 8 per cent more good production.

In considering such a possibility many questions will naturally arise. Who is to determine machine capacities, and how is quality to be controlled?

The answer to these must come from the management. It is a mistake to expect either the time study man or the engineer to solve technical problems of this nature in the paper making field. In our own experience, we have depended on the mill manager, or superintendent, to determine machine capacities for different basis weight, deckle, and qualities, and in each particular case have worked out with them, according to requirements, the detailed operation of the various tests for weight and quality, in order to maintain the necessary control. In most instances, we have set up separate qualifying penalties for variations from allowable basis weight, and where desirable or necessary have followed the same principle in controlling the various quality considerations.

This type of incentive application is neither simple to set up, nor easy to maintain. It undoubtedly requires closer attention and better supervision than any ordinary incentive, to keep it operating properly. On the other hand, the savings that can frequently be realized by it are so satisfactory that they amply justify the time and effort necessary to obtain the result. Like most all developments in the engineering field, improvements come through experience, and no doubt continued experimentation by a combination of progressive management and competent engineering will result eventually in simplifying and strengthening this type of control.

One of the drawbacks to economical operation, with which you will undoubtedly all agree, is the excess cost caused by short runs and narrow trim. While the type of control described will certainly not cure that headache for the operating man, the information obtained by it can be used as a lever to influence sales policy, if management chooses to do so. In our own experience, we have never felt that the most effective use has been made of this data, but perhaps that is because we have never been smart enough ourselves to sell the idea effectively.

A beater crew's duties consist principally in supplying the beaters with the proper furnish, and dumping. The main difficulty in covering this work with satisfactory rates is due to the extreme flexibility required of the crew, and this can be taken care of by putting the whole crew into one group and paying them on the basis of pounds in, or out, whichever is the easiest to check. While theoretically they might be tied directly with machine production, it has been our experience that there are generally so many variables between the beater room and the end of the machine that the control by this method is too remote to be practical. We have had a number of cases in which labor savings on this class of work have run to 20 per cent or better.

Opportunities for Cost Reduction

There are two other groups of labor in the average mill that offer very real opportunities for cost reduction, if they can be satisfactorily covered. The first of these is in storage and shipping, which is often used as a reservoir for surplus help. The difficulties in obtaining a result on this kind of work come, not from trouble in setting correct rates for the various jobs, so much as from uncertainty as to just what work has actually been done. It is therefore principally a problem of checking the production of the individual, and the fact that storage facilities are generally in an out of the way place where it is harder to see what is going on, does not add to the ease of handling it. Were it not for the fact that the intermittent and irregular nature of the work tends to make it relatively ineffective, and therefore, offers large opportunities for savings when properly controlled, it would not be worth the trouble. As it is, however, savings generally run 25 per cent or more, which is usually enough to justify considerable effort to get it.

The other large expense is maintenance labor, and we do not believe that the best answer to the control of that has yet been developed. Several methods have been tried in different mills by different people, all of them with some success. We have used different variations of a budgetary control which have resulted in some excellent savings, but are not satisfied that that is necessarily the ultimate answer. In other industries we have recently developed a more exact method, previously described, which seems to offer greater possibilities for really good control, but we have not as yet had an opportunity to try it in the paper industry. This whole subject is one which is in the process of engineering experiment and development today. In our opinion, it offers such an enormous opportunity for savings that it will undoubtedly receive a great deal of attention, and constructive thinking will unquestionably produce results.

No discussion of wage incentives would be complete without some consideration of its relationship to the labor problem as a whole. Today, more than ever before, it is essential that both management and labor have a better understanding of each other's problems. Union activity, especially in its more rabid manifestations, has tended to interfere with normal progress along this line in the last year, and yet it has succeeded in crystallizing the attention of many executives on questions which may have long needed consideration, and which in too many cases have been taken as a matter of course.

Next to job security, the thing that every working man is most interested in is his week's pay. We all of us have pretty definite ideas as to what we are worth to our employer, and the laboring man is no exception to this rule. The fact that his ideas as to his value may appear to us, at times, to be inflated, does not alter the fact that he has those ideas and that they must be given consideration. Consequently, if management is to be in a position to discuss intelligently that value, and to arrive at some amicable agreement as to the worth of both the job, and the individual to the company, it is essential that it have some logical analysis on which to form its judgment.

Just as there is no more effective way of doing this than by maintaining a regular production record of the performance of each individual, there is no better way of increasing the actual value of the individual than by using that record as a basis for his compensation through the use of an incentive attached to it. With such a plan in effect, all guesswork as to the worth of the individual is removed; he can, and if properly handled, he will, stand on that record; and control, both of his earnings and his employment, can be maintained by mutual agreement in relation to his performance.

With the knowledge and control that are obtained through accurate measurement of individual production, inequalities in earnings, and irregularities in working conditions, both of which are a prolific source of labor unrest, can be reduced to a minimum; grievances over compensation can be settled promptly on the basis of facts shown by conclusive evidence, rather than by guesswork or opinion; and the highest possible wages can be paid on the basis of actual performance, without excessive labor cost.

One of the principal reasons for labor trouble in recent years has been the inability of management to maintain a close enough contact with the individual employee to find and eliminate sources of irritation before they became of major importance. Failure to correct obvious injustices of which management was unaware, has too often been the entering wedge for labor agitation. Although recognition has infrequently been given him from this standpoint, the value of the right kind of time study man for the purpose of keeping management in close touch with labor and labor conditions, is inestimable. Based on our own experience, a competent man, such as we have attempted to describe, through his daily contact with the employees and their problems, can be of greater service both in eliminating possible causes of friction, and in explaining the company's position on matters of mutual interest, than any other person in an organization.

In conclusion we would like to add one more thought to this discussion. The establishment of wage incentives is not an exact science; nor is the profession of industrial engineering static. It is true that certain faundamental principles, both as to methods of analysis and in the approach to labor, have been fairly well established as the result of long experience, but within the framework of those principles the detail of handling individual problems is limitless in its cariety. No two problems are ever quite the same in all details, even on the same type of equipment, or the same kind of work, or in the same industry. Consequently, with varying conditions, study of those details and analysis of the facts obtained is absolutely essential if the correct answer is to be found. And last, although technical knowledge is of tremendous value in the study of any situation, there is never any substitute for plain common sense.

To Make Sulphate of Alumina at Mobile

The American Cyanamid and Chemical Corporation has purchased a site on the terminal railway of the Alabama State Docks Commission in Mobile, Ala., for the construction of a chemical plant.

Construction of the first unit of the plant will start immediately and the chief product will be sulphate of alumina, which is used for water purification and in the manufacture of paper.

The American Cyanamid and Chemical Corporation has a large number of customers in the Mobile area and this plant will serve that trade.

This company has also procured a tract of land at Savannah, Ga., on which to build a plant for the manufacture of miscellaneous heavy chemicals, including sulphate of alumina.

The Control Of Printing Quality In The Paper And Board Mill*

By Gerard L. Larocque[1]

Summary

The two first properties to be controlled for good printing are the printing-smoothness or "finish" of the paper and the ink—or oil—absorbency of the paper surface. It is claimed that no single test will satisfactorily measure printing-smoothness but a combination of smoothness and softness gives a better indication of the "finish" than either test alone.

An oil flotation test corrected for temperature and caliper will give a good indication of the oil-absorbency for certain types of paper. A new surface oil-resistance test is described which can be used for all classes of paper and paper-board. Using this test, experimental results are presented indicating that (i) the drying behavior of the ink is influenced by the oil-resistance of the sheet, (ii) some variations in the oil-resistance of any one grade of paper are serious enough to affect adversely the printing quality, (iii) oil-resistance and printing quality can be readily modified by surface sizing.

The Control of Printability

The goal of perfection in printing is to be able to place on the surface of the board or paper, a perfect reproduction of the design on the printing plate. Subsequent to this transfer of ink on to the paper, the paper surface must have the correct oil-absorbency so that the ink will "set" or dry on the surface at the proper rate. This should be fast enough to prevent any offsetting or smudging of the ink and yet slow enough to ensure sufficient binding of the pigment to the paper, and the right amount of "gloss" in the dry print.

In addition to the above considerations of printing-smoothness and ink-absorbency, another requirement is that the surface of the sheet should be easily wetted by the printing oils. However, since paper-making materials usually have sufficient wettability for good printing, this factor will be omitted from the following presentation.

Good printing therefore requires at least two distinct sheet properties which we will refer to as "printing-smoothness" and "ink-absorbency." The first demands that the surface of the paper should be sufficiently smooth and the sheet structure sufficiently soft, so that each portion of the paper surface destined to receive ink may make adequate contact with the inked portions of the printing plate.

Poor printing will result from lack of contact on minute depressions left by the wire or felt, or interstices between the fibres which are too deep to be filled by the film of ink. Alternatively, tiny high spots on the surface may be subjected to excessive pressures which will squeeze some of the ink from the surface of the fibers at those points causing minute blemishes on the print.

The Measurement of Printing-Smoothness

The first requirement for good printing is to have a sheet which under a printing pressure of several hundred pounds per square inch will become smooth and level. No instrument on the market will give a numerical measure of this "smoothness-of-paper-under-printing-pressure" truly comparable to the act of printing. For the evaluation of this property, indirect methods must be used instead.

A number of instruments measure the leakage of air between a sample of paper held in contact with a smooth metal plate under a definite pressure. Three such instruments are the Bekk, Gurley and Williams smoothness testers which have been examined at the Appleton Institute of Paper Chemistry *(1)*. Devices operating on this principle undoubtedly give a first order approximation of the printing-smoothness of the sheet, but the method is open to criticism in that the test is performed at pressures ranging from 0.5 to 30 lbs. per sq. in., which are very much lower than those actually used in printing.

Halladay *(2)* has shown that for paper-board this method can be improved considerably by making two measurements at pressures of 50 and 100 lbs. per sq. in. respectively and extra-polating the results obtained to printing pressures. The difficulty in using these higher pressures is that considerable leakage of air through the body of the paper-board will result unless special precautions are taken.

A method which operates on an entirely different principle, and which uses high pressures has been recently developed by Davis. This and other promising methods have been examined at the Appleton Institute of Paper Chemistry *(5)*, but are not yet fully developed.

In view of the low pressures employed in those tests which operate on the air-leak principle, it was suggested that a better indication of printing smoothness might be obtained by the use of a smoothness test combined with a measurement of the *softness*, or ease of deformation of the paper. It was suggested that a paper that was both smooth at low pressures, and soft enough to be readily compressible, would be capable of giving a smooth and level surface at printing pressures.

Softness can be measured by the Gurley-Hill softness tester, which was examined at the Pulp and Paper Division. In combination with a test for smoothness the softness test was found to be a distinct improvement over smoothness alone for the evaluation of printability. In the present instance this softness tester was used in conjunction with a Bekk smoothness tester. Although the conclusions arrived at are the result of measurements made with these two particular instruments, they can probably be applied equally well to combinations of other smoothness and softness testers operating on similar principles.

In order to investigate the effect of softness and smoothness on printing quality, 26 samples of s.c.,

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[1] Contribution from the Forest Products Laboratories of Canada-Dominion Forest Service Lands Parks and Forest Branch-Department of Mines and Resources.

m.f. and e.f. book and litho paper were selected and tested both for smoothness and for softness. The samples were printed on a proof press under closely controlled conditions, using a 120-line screen halftone block and a solid black. The prints were then graded in order of printing quality by eye. The detailed procedure and the results obtained have been described in a previous paper *(4)*.

It was found that a rough relation existed between smoothness and printing quality, in that the smoother papers generally gave the best prints. There were however many exceptions in which the best print did not correspond to the smoothest paper. In almost all such cases however, it was found that the better print was on a softer paper.

Apparently good printing depends upon both smoothness and softness of paper and a combination of these two tests gives a far better indication of printing quality than either test taken separately. The two tests seem to be equally important in fixing printing quality. If a pair of similar papers are selected, then the paper having the highest ("Smoothness" x "Softness") product gave the best looking print in well over 90 per cent of the trials. Some exceptions were observed. Two book papers were compared which had the same softness but differed in smoothness as 8 is to 11. Contrary to expectation, the *less* smooth of the two papers gave definitely the better prints in repeated trials. In the case cited, the two sheets were quite different in furnish, which may have influenced the result. Fortunately, such exceptions are not numerous enough to seriously detract from the general usefulness of this type of test for purposes of control. Nevertheless such instances do arise and indicate that a perfect testing method for measuring the printing-smoothness factor has yet to be devised.

Optical methods such as the Ingersoll Glarimeter and the Oxford Glossmeter are also used for indicating the finish of paperboard and paper. They offer the advantage of being rapid and convenient to operate, but obviously they can only be used for controlling printability when a definite correlation has been previously established with printing quality, and then only for that particular grade of paper.

The Measurement of Oil-Absorbency

It has been shown that the transfer of the design from the inked plate to the paper surface is largely governed by the factor of printing smoothness. The next step is to consider the drying of the film of printing ink after its transfer to the paper. The oil-absorbency of the paper is its most important property in the ink-drying operation and should therefore furnish a second criterion of printing quality.

Depending upon its composition, the drying of printing ink on paper can occur by penetration, by oxidation or by evaporation. In the printing of newsprint and some cheap magazines, a "non-drying" (i.e., "non-oxidizing") mineral oil is used as the vehicle for the pigment so that drying takes place entirely by penetration or absorption of this oil into the paper. Should this absorption take place too slowly the printed matter will tend to smudge or offset on to other sheets. Too rapid a penetration apparently can do no harm providing that the sheet has sufficient capacity for oil so as not to become unduly transparent and cause "show-through."

In better classes of printing, vegetable "drying" oils are used as vehicles for the ink. Drying then takes place partly by penetration and partly by atmospheric oxidation. With such inks a balance must be maintained between absorption and oxidation in order to give the best printing results. If absorption of the vehicle into the paper occurs too slowly, the printed matter will tend to offset or smudge, as in the case of the non-drying mineral oils. If absorption occurs too rapidly, insufficient oil or "varnish" will remain on the surface. The print will have a dull appearance and in extreme cases the pigment may be so unsecurely bound to the paper that it will tend to dust off. If the oil-resistance of the paper surface is irregular in patches, a mottled appearance may result with "gloss" inks.

A third type of printing is that where a light volatile solvent is used for the ink vehicle, as in rotogravure, and the ink dries by evaporation of the vehicle, with or without the application of heat. In this type of printing, the absorbency of the paper will determine the amount of ink taken up from the printing cylinders and the depth to which it will penetrate into the paper.

Consequently with each type of printing it is essential that the drying properties of the ink be suited to the oil-absorbency of the paper in order to obtain the best results. That is not difficult since the ink is probably the most flexible and controllable variable in the whole printing process. In the hands of an experienced printer, the composition of the ink can be adjusted to suit the absorbency of any given grade of paper or paper-board within wide limits of oil absorbency. In fact in the larger printing shops, it is the usual practice to have an experienced ink-maker specially prepare each batch of ink to suit samples of the paper before sending a lot of paper through the presses.

The best ink for a particular grade having been selected, it is essential that within any one lot of board or paper the variation in ink-absorbency of individual sheets should be reasonably small. The printer can adjust the composition of his ink to suit almost any paper but he cannot allow for continual and irregular variations in absorbency. It is prudent to keep the absorbency of any one shipment of a given grade of paper constant within a reasonable set of tolerances. This is no more difficult than the maintenance of the customary standards for strength, caliper, opacity, colour, etc. which in some cases may not be as important to the user as the printing quality.

For measuring the oil-absorbency of the paper surface a number of methods can be used which have been described at various times. There is the "Oil-Absorption" test described by Wemhoff *(6)*, in which a drop of oil is placed upon the sheet to be tested and spread out by means of a small gelatine roller. The time required for the film of oil to disappear is noted. There is also the "Oil-drop Penetration" test in which the time required for a drop of oil to penetrate *through* a sheet of paper is observed. Such a test is obviously not applicable to paper-board. A third method is that described by Grantham and Ure *(7)* who used a considerably smaller drop of oil than either of the two previous tests. A fourth one is the "Surface Oil-Resistance" test which was developed at these Laboratories *(8)* and which will be described later.

The first method is open to the objection that the end-point is difficult to determine with accuracy. The second and third methods make use of a much

larger amount of oil than is used in printing so that a flooding of the sheet structure results.

By observing certain precautions useful information concerning the oil-resistance of the paper may be obtained by the Castor Oil Flotation test or any other similar measurement of the time required for the penetration of oil from one surface of the sheet to the other. For this test a number of small samples of paper are floated on the surface of Castor Oil—or alternatively the vehicle of the printing ink to be used with the paper. The time required for the oil to penetrate through the paper until the sample assumes a uniform gray colour is taken to be a measure of the oil-resistance of the sample. Unduly long times caused by a shive or fiber bundle must of course be rejected and a sufficient number of tests must be performed to obtain a good average value.

It is essential to perform the test at constant temperature or to note the temperature and convert the observed time to a standard temperature by means of a suitable correction table *(8)*. With care an experienced operator can duplicate this test after the lapse of several weeks to within plus or minus 10 per cent, which is sufficient for many problems relating to printability. It has suggested that by sprinkling the sample with a dye which fluoresces in contact with the oil used and using an ultra-violet light source, an accuracy of plus or minus 5 per cent might be obtained.

Should the samples being compared differ even slightly in caliper the observed time must also be corrected for sheet thickness if the results are to have any significance at all in relation to printing. It has been shown previously *(5)*, that the resistance to oil penetration varies as the *square* of the sheet caliper. Consequently, the "specific oil resistance" of a sheet can be defined, in metric units, as the time in seconds required for the penetration of a sheet 0.1 mm. (0.004" approx.) thick, and is calculated as follows:

$$\text{Specific oil resistance} = \frac{(\text{Time of flotation, secs.}) \times 0.01}{(\text{Caliper in mm.})^2}$$

The oil-resistance, calculated in this manner, will give a good approximation of the resistance of the paper surface to penetration by printing oils which may be sufficient in many cases. The test fails completely with coated papers and is not reliable for super-calendered, calender-sized and sub-sized papers and other papers where the surface of the sheet differs distinctly in oil-resistance from the interior.

The Surface Oil-Resistance Test

In view of the above objections to the oil-flotation type of tests, a new method was developed at the Pulp and Paper Division for measuring more directly the oil-resistance of the surface of a sheet under conditions more similar to actual printing *(8)*. A thin film of oil, of the same order of thickness as a film of printing ink, is placed on the paper surface, and the time required for its disappearance is observed. A circular film of oil, ⅛ inch in diameter and 3/10,000 inch thick is extruded from the tip of a specially ground glass capillary. On pressing this glass tip to the surface of the paper the drop is transferred to the sheet and the time required for its disappearance is observed by means of a special illuminator. The mean time for ten such drops is taken to be the surface oil-resistance of the paper, and is recalculated to a standard temperature of 70 deg. F. by means of suitable temperature correction tables.

With more oil-resistant samples such as coated and S.C. papers, the time required for this test may be considerably shortened by the use of a mineral or vegetable oil of low viscosity instead of the standard castor oil.

Variations in the Oil-Resistance of Commercial Grades of Paper and Paper-Board

In the following experimental results it will be seen that large variations sometimes occur in the surface oil-resistance of successive shipments of the same grade of paper, or in successive samples taken from the same machine "run" or shipment. The presence of surface sizing will be seen to markedly affect the oil-resistance, and instances will be given indicating the close relation between printing quality and the oil-resistance.

In presenting this data, it is to be emphasized that it is not the *absolute* value of the oil-resistance that is usually important, but the *uniformity* in oil-resistance of a particular grade of paper.

In order to be on a comparable basis, all the surface oil-resistance measurements have been reported in terms of castor oil seconds corrected to 70 deg. F. The results presented will be discussed separately after each group of tests.

Section I

VARIATIONS IN THE SURFACE OIL-RESISTANCE OF DIFFERENT SAMPLES OF THE SAME GRADE OF PAPER-BOARD

"A" Company

No. 1 Patent Coated Manila back	No. 1672a.....	417	Secs.
Patent News back	No. 1672b.....	80	Secs.
Patent News back	No. 1672c.....	824	Secs.

This is an unusually severe variation in oil-resistance in different runs of the same grade of board. The large difference between samples "b" and "c" was subsequestly traced to the use of a harder beating bleached sulphite pulp for sample "b" than was used for sample "c." The difference in printing behavior of these samples was very considerable.

"B" Company

Coated Boards. July 1935	No. 2116.....	220	Secs.
Aug. 1935	.....	115	Secs.
Dec. 1935	.....	117	Secs.
Feb. 1936	.....	175	Secs.
Aug. 1936	.....	217	Secs.
Oct. 1936	.....	226	Secs.
Apr. 1937	.....	217	Secs.
Sept. 1937	.....	192	Secs.

This indicates the variations which took place in the surface of oil-resistance of successive runs of the same grade of board over a period of over two years. The printing quality was in general satisfactory.

"C" Company

Coated Boards, Starch-sized at the calenders, variations taking place during a 24 hour run.

No. 2322	226	Secs.
	263	Secs.
	151*	Secs.
	263	Secs.
	169*	Secs.
	226	Secs.
	432	Secs.
	338	Secs.

This indicates the variations which took place during the course of a 24 hour run on the same grade. The low oil-resistances of the samples marked by an asterisk (*) were subsequently found to be associated with a deficiency in the amount of starch, as shown by an iodine test. Such differences are large enough to affect printing quality.

"D" Company
Paper-board for use with Gloss Inks. No. 1961 a 296 Secs.
b 196 Secs.
c 296 Secs.

On printing, board "b" gave an unsatisfactory gloss, considerably less than that given by samples "a" and "c," presumably due to insufficient varnish remaining on the surface of the board.

"E" Company
Kraft-lined board LOG. 0211 a 147 Secs.
b 93 Secs.
c 75 Secs.
d 82 Secs.
e 163 Secs.

Sample "a" is a board that printed well. The ink apparently dried slowly enough to give a good glossy print. Samples "b," "c" and "d" are samples from a different board-machine and gave dull prints. The test diagnosed the trouble as due to insufficient oil-resistance. On increasing the surface sizing the sheet "e" was obtained which gave as good or a better printing surface than the first sample.

"F" Company
No. 1 Patent-Coated board for candy boxes No. 1749.
a 468 Secs.
b 438 Secs.
c 368 Secs.
d 338 Secs.
e 331 Secs.
f 373 Secs.

These are repeat orders for the same grade of board. It was claimed by the customer that sample "e" did not absorb the ink as readily as previous runs, and had a tendency to smudge. The surface oil-resistance test does not support the customer's claim. This is the only instance encountered where the results of the test were at variance with printing behavior. Since the samples were printed at quite different times, changes in the drying properties of the ink may have taken place.

Section II

The Effect of Sizing and Finish Upon the Surface Oil-Resistance of Paper Board

"G" Company
Coated board, no sizing normal finish No. 2148 154 Secs.
added casein, normal finish No. 2145 205 Secs.
added casein, high finish No. 2147 288 Secs.
"H" Company
Coated board, no surface sizing No. 2138 153 Secs.
No. 2139 211 Secs.

The effect of the added sizing material on the oil-resistance is obvious.

"J" Company
Coated board, no sizing No. 2164 184 Secs. glossy print
some starch added No. 2166 192 Secs. glossier print
more starch added No. 2165 250 Secs. glossiest print

In this case actual printing experiments confirmed the increase in oil-resistance. The above differences in gloss were easily discernible.

Section III

Variations in Surface Oil-Resistance for Different Grades of Paper

"K" News Print

		Felt	Wire
1st Company	No. 2340a	45	27 Secs.
	b	28	22 Secs.
2nd Company	No. 2000a	42	26 Secs.
	b	39	18 Secs.
	c	22	18 Secs.
	d	30	19 Secs.
3rd Company	No. 1732a	27	19 Secs.
	b	59	23 Secs.
	cc	49	39 Secs.
	d	41	39 Secs.
	e	29	34 Secs.
4th Company	"A"	38	53 Secs.
	"B"	58	83 Secs.

Considerable differences are observed in samples obtained from the different companies. Insuffient data is available to comment upon the significance of these differences in terms of printing quality except for the last two samples. The more resistant sample "B" was claimed to take up ink from the type less readily than did sample "A."

"L" Mimeograph Paper

		Felt	Wire
Canadian Company	No. 2238	30	30 Secs.
U. S. A. Company	No. 2239	47	31 Secs.
"M" Gravure Paper			
Canadian Company	No. 2351	207	245 Secs.
Canadian Company	No. 2352	245	226 Secs.
German Company	No. 2353	198	245 Secs.
"O" Offset Paper for Magazine			
	No. 2015	51	59 Secs.
	No. 2016	48	43 Secs.

These results indicate how papers made in different countries can be similar in oil-resistance.

"P" No. 2 Book Paper
Variations over a period of two years. Wire side only.

September, 1935	No. 1760	324
		361
		242
		326
		231
		238
May, 1937		359

These figures indicate the extent of the irregular variations which took place over a period of nearly two years on successive runs of the same paper. No information is available with regard to the printing behavior.

"Q" No. 2 M. F. Book Paper
Variations in successive samples of the same paper.

No. 1671	51
	39, 38 test repeated
	66
	44
	55
	38
	40
	31, 31 test repeated
	60
	63
	44

These variations in oil-resistance were sufficient to interfere with printing behavior.

"R" Grades of Paper Made by One Company.

Book Papers		
LOG. 0327		
SC No. 1	Book a	171
	b	305
	c	238
	d	354
	e	261
MF No. 1	Book a	140
	b	147
	c	114
	d	63
	e	128
MF No. 2	Book	107
MF No. 4	Book	103
EF No. 4	Book	47
Litho Papers		
SC No. 1	Litho a	354
	b	207
SC No. 3	Litho	247
MF No. 1	Litho a	142
	b	68
EF No. 1	Litho	121
Miscellaneous Papers		
Featherweight	Book a	47
	b	58
Cartridge Envelope	a	231
	b	168

These figures indicate the magnitude of the variations which would be expected to occur between different grades of paper made by the same company. The letters "a," "b," "c," etc., refer to different grades of paper within the same classification.

Conclusions

The main conclusion to be drawn from the above tables is that the ink-drying behavior is undoubtedly influenced by the surface oil-resistance of the sheet. Secondly, accidental variations in the oil-resistance occasionally occur which are large enough to inter-

fere seriously with the printing quality and finally the oil-resistance of the sheet surface can be largely modified by the use of surface sizing.

The magnitude of the variation in surface oil-resistance that can be allowed in practice without affecting the printing quality of a particular grade of paper will depend upon the conditions of printing and the standard of excellence required. For this reason it is not possible at the present time to give any set of allowable tolerances for oil-resistance. Experience alone will determine what variations are allowable for each class of work.

The wider adoption of methods for controlling printing quality would help smooth out many printing difficulties by indicating more clearly the nature of the trouble. In many cases the paper may not be to blame and the cause of the difficulty may be due to unusual press conditions, a different ink or to variations in the atmospheric temperature and humidity.

The present surface oil-resistance test does not pretend to be a "cure-all" for every ink-drying ailment. Taken in conjunction with due regard for the effect of other factors which may be influencing any particular case, this method is only suggested as a further step towards the control and manufacture of better printing papers.

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The Maintenance Engineer in a Pulp and Paper Mill *

By Grover Keeth [1]

I have been asked by your chairman to speak on maintenance of paper machines and equipment from a mechanical and engineering standpoint rather than from an operator's standpoint. This is rather a difficult thing for me to do, because I feel just as much responsibility in producing a good sheet of paper as does the mill superintendent. Were I choosing a title, I would just as soon be called Mechanical Superintendent as Chief Engineer. However, I shall try to entertain you for a few minutes with such ideas as I have. Since the idea of an engineering group in this Association is new, and this being one of the first papers to be presented before such a group, it seems to be better at this time to discuss generalities rather than details, with the thought in mind that a general statement will probably produce more discussion than will a detailed statement. To my mind one of the greatest assets of our Association is a frank discussion of its problems. Also, I intend to use an author's prerogative in riding a hobby or two. Further, what I do say may be somewhat disconnected.

Some time ago I heard the remark made that a consulting engineer is a man who obtained a job and then consulted his friends as to how it should be done. When I was asked to present this paper—I "consulted" our industrial relations department, our purchasing agent, and several of my assistants for advice on what to say, and I wish at this time to thank them for assistance rendered.

It is a fact, however, that some of the machine operators consider the maintenance man as a necessary evil, one to be bawled out when things go wrong, but not one to co-operate with so that things are kept from going wrong. This may be his own fault for not trying to gain the confidence of the different Superintendents, tour bosses, and machine tenders, so that they will co-operate with him for their mutual good. Some illustrations of what the operator can and sometimes does do, to give the maintenance man a *break* are as follows: Notify him about an anticipated shut-down, to change felts, wire, wash up, etc. There may be a motor control contact that is bad and that he has been hoping against hope he will get a chance to repair before it causes a shutdown.

A maintenance man generally has some chronic peeves, but I think his pet peeve, especially an electrician's, is to get a phone call to come to some machine or department, usually at the other end of the mill, without being told what has happened. He could have saved some time by bringing the proper tools, fuses, tester, etc.; instead he usually is forced to go, or send back to the shop for them, meanwhile being admonished to *hurry up*.

Another pet peeve is the reluctance of the machine help, upstairs or in the basement, to clean everything —floors, walls, anything that strikes them as needing a little cleaning—in any other way, than by giving it a good soaking with a water hose with plenty of pressure back of it. This has a very depressing effect on any motors, starters, switches, etc., that aren't waterproof. Most motors that are bought nowadays in paper mills are splashproof, but an old mill still generally has a lot of the old type open and motors that receive a goodly percentage of the water intended for other objects.

First, what sort of "egg" is a maintenance engineer? I should say that the head of his department must be a man who has had considerable experience wih power generating equipment of all kinds. He must know something about chemistry. He must know something about every type of mechanical con-

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[1] Chief Engineer, Marathon Paper Mills Co., Rothschild, Wis.

trivance from a watch to an automobile, and while he need not be a specialist in any of these machines, he should be able to pick out from his several workmen, men who are—and see that they do the fine adjustment on the type of machine about which they know the most. Above all, however, he must have fundamental training in the old circus adage "The show must go on", because it is his task to see that the several parts of the mill keep running in order that the sales department may make good on their promises. He must also have the ability to hear from the operator what he thinks happened when a breakdown occurred, before deciding that the mechanic's statement, that the breakdown is due to the operator, is the correct answer. Again, he must know what supply house can help him out in a hurry.

He must try to train his men to see with his eyes because it is physically impossible to be everywhere at the same time, and, unless he can train his workmen to see a particular machine as he would see it, he will have difficulty in getting a complete and correct report of what happened when a breakdown did occur. For example, we have had several failures with a gear head motor in a certain location. When I entered the mill the other morning, the operating superintendent informed me that the gear head of this motor had failed again. They had not, however, stopped the machine to draw the coupling bolts, but had disconnected the motor electrically and were allowing the felt to pull the motor. I accepted this statement as correct, telephoned both the paper machine and motor manufacturers in strong terms, went to the expense of having a new set of gears shipped by express, and had two representatives of the motor company at the mill the following Sunday. After dismantling the entire device the trouble was found to be in one of the bearings of the motor. There was nothing wrong with the gear head at all. Had I insisted on power being put back on the unit we could easily have determined that the trouble was in the motor, and not in the gear, and saved the expense incurred by assuming the trouble to be elsewhere.

Maintenance and Repairs

In my own mind I would divide the mechanical work of keeping a paper mill moving, in two parts maintenance and repairs.

Under the subject of maintenance I would have certain men in the operating crew, whose duty it is to oil and grease the machinery, pack pumps, put on belts, change rolls, examine the external parts of machines for the determination of wear; in fact, most of the work that does not require parts to be made in the shop, fine adjustments, or the putting together of a new part or machine for the first time. To my way of thinking the work just mentioned is part of a job of running a machine, and if properly done will result in a decrease of the number of breakdowns that cause loss of time and heavy repair costs. While the deportment (shall we call it) of these men should be under the operating department, it is necessary that the repair department instruct them in their methods so that the work they do be done to the best advantage. The oiler, since he sees all parts of a machine frequently, should report loose bearing caps, hot motors, leaky stuffing boxes, etc., so that they may receive prompt attention. The handy man who has just shortened a belt must be reprimanded if he does not replace the guard, and, if he reports this guard broken, his complaint must be attended to or else some one may be hurt.

The maintenance of a paper machine and its auxiliary equipment involves varied problems in all phases of the engineering field. The engineering calculations and figuring of data is to the engineer the least of his problems. The difficulties and complications, however rest in (a) determining existing defects and possible breaks so as to spot a failure before it occurs and causes a shut down, (b) determining true cause and source of trouble or failure, (c) making repairs to machines and equipment while operating, (d) estimating time required to complete a shut down repair job, (e) training mechanics to recognize the importance of items under a, b, c and d.

To illustrate a few of these points—the operating department reports that a certain centrifugal pump is too small and asks that a larger one be installed, this request in spite of the fact that the mill is near the point of exceeding the demand on purchased power. The maintenance man, however, should be skeptical enough to check the amount of water required from this pump and conclude the pump is large enough and that there is something else wrong. Upon opening the pump casing he will find a piece of wood in the impellor.

Again—he finds that the operators have put additional weights on a suction press roll and are still complaining that the sheet is wet and that the vacuum pump should be speeded up. Operation of the vacuum pump with a closed suction shows that the pump is in satisfactory condition. The trouble is finally found to be due to the holes in the suction roll filling up with scale. After this is corrected a method must be devised to prevent its happening again. We should not be satisfied that the first weakness observed is the real cause of the trouble.

Training of Mechanics

In training your mechanics an effort should be made to teach them to seek the source of trouble by process of elimination rather than by trial and error.

In making repairs to a running machine, the first thought in the mechanic's mind must be safety. Next he must plan his line of attack before starting. Lastly, if it is a complicated job and one liable to occur again, it is well to review the job after completion so that the next time it may be done better and quicker.

In the matter of belting we have found it advisable to purchase belts to specification and lengths to fit the individual drives, rather than keep a roll of belting in the storeroom and cutting off the required number of feet. If the drive is important enough, a spare belt should be carried properly tagged so that it will not be used elsewhere. It was our experience, that, when taking belting from stock considerable waste occurs. Splices were improperly made, and frequently the wrong kind of belting was used.

Several years ago we began a practice of installing anti-friction bearings whenever possible and we have found not only a saving in power, but less repair cost, less lubrication, greater convenience in applying lubricant, and greater improvement in cleanliness. In the installation of anti-friction bearings care must be taken to install expansion type bearings on

one end of a long roll or similar situations. As to the choice between roller and ball bearings the only comment I care to offer is that I have not had successful experience with ball bearings on heavy loads.

With reference to motors, it has been our recent practice to buy only splash proof motors with antifriction bearings. There are, no doubt, many locations where the cost of splash proof motor is unnecessary, but in our mill motors are moved around so frequently that we consider it advisable to buy the higher priced motors.

In the maintenance of floors, I have tried several different kinds of floor hardeners, about as many kinds of steel mesh reinforcements, and in despair tried rubber tires on our trucks. This I found to be the answer.

Within the last few years many types of stainless steel have become available, some of which have virtue--but they must be used with discretion and with the advice of the manufacturer on selection of the right metals for the right use. If properly selected, these metals save many dollars in labor and materials. Some of these will not stand machining without heat testing, and this should be found out before using.

In the matter of paint we have again experimented with many products and have just about decided to confine our uses to red lead and aluminum.

If some of your leading mechanics are men who have received all their training in "out of the way places" where they have been forced to make everything they used (this is an admirable thing for them) but, we have found it cheaper to buy standard products rather than to make them. This leads to the point that in designing or buying a machine every effort must be made to see that the parts are standard and that these parts are of the same make as the majority of those in the mill, otherwise the maintenance department and stores department will soon find themselves with a museum on their hands.

It is a great help to keep a card index of all motors, pumps, and similar machinery on which is kept full name plate data so that when a part wears out it is not necessary to try to read a badly corroded name plate. If it is possible to do so, and I think in most cases it is, a schedule should be made and followed whereby every machine that can be opened up, be opened up at regular intervals for examination and if the parts begin to wear, spare parts can be on hand by the time a failure occurs.

Another point that I would like to make is that a device that will work in one mill will not necessarily work in another one. Not because only one man knows how to run it, but because there are some slight differences in the kind of pump used, the kind of water used, or the speed at which it runs. I recently heard Dr. Davis of the American Institute of Chemical Engineers, remark that "mechanical engineering is an art rather than a science." He pointed out that every important development in chemical and electrical engineering had come from the laboratory, whereas every important development in mechanical engineering had come from practical experience. As making paper is largely a mechanical operation I hold that paper making is an art.

Some of you may have expected that I would tell you how to keep a paper mill from shutting down—I do not know how.

Operating Results Of The New Type Black-Clawson Wet End*

By L. E. Weiser [1]

In 1937, we completed an extensive modernization and rehabilitation program which included an entirely new stock preparation system and a new wet end for our 143 inch No. 1 board machine. Time limitations do not permit of a general discussion of all of our new equipment and I am, therefore, going to confine my remarks to the new wet end, although the favorable results obtained from this unit are, to some extent, dependent on the extremely efficient breaker beaters, screens, refiners, pulpers, and other equipment which are a part of our new beater system.

Before making any decision with regard to the type of wet end to be installed, we naturally made an exhaustive study of the various vats and auxiliary equipment available. A number of mill visitations were made and the helpful cooperation of the superintendents in charge enabled us to carefully weigh the advantages and disadvantages of various types of equipment which they were operating. One progressive mill, which was operating Black-Clawson uniflow vats with considerable success, demonstrated the way in which these vats crossed stock fibers by using a slide projector. This was of particular interest to us as the strength requirements of board for some of our orders are unusually high. On certain jobs, where solid ink coverage and varnish are necessary with the sheet running the wrong way for good cutting and creasing, fiber strength is very important. The crossing or interlocking of fibers as accomplished by the uniflow vats was, therefore, very desirable and it was this characteristic of the Black-Clawson equipment more than any other single factor which sold us on these vats.

The actual installation of the new Black-Clawson wet end with uniflow vats was a real problem. Space limitations were a severe handicap, particularly as we had decided to add another cylinder mould. However, with the able assistance of the Black-Clawson engineering staff and our own mechanical department, plans were developed which enabled us to install all of the necessary equipment in the space available, although in several locations pumps, motors and

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[1] National Folding Box Co.

other equipment were fitted into spaces with less than ½ inch to spare. The problem was further complicated due to the fact that the pipes and pumps were necessarily much larger than we had previously used, due to the low stock consistency requirements of the uniflow vat.

We were all a little on edge when we started up our No. 1 board machine on Feb. 4, 1937 as we anticipated the usual difficulties and headaches which we have learned from experience to associate with new equipment. Our men were absolutely unfamiliar with the new type vats and other gadgets and we crossed our fingers when the machine started to turn over. Our worries, however, disappeared into thin air and, believe me, it was a revelation to see the machine go to work and a fine sheet of board coming over within a few hours. I have never seen a board machine that operates as safely and runs as smoothly as our No. 1 machine, day in and day out. It was rather amusing to watch the boys try to tear a tail for the driers and finally give it up as a bad job when they found out that it simply couldn't be done. We didn't have to wait until the paper was over the driers to find out that the fibers were well crossed after this demonstration. Incidentally, we use a cutter similar to a glass cutter to cut or tear a tail today.

Our wet end as finally installed has seven uniflow vats, two primary suction rolls and one suction main press. The long pick up felt runs in the forward direction and the short bottom felt comes back as far as the first primary suction roll. In order to make room for our seven vats, we had to eliminate one of our finish presses, with the result that we have only one finish press for each side of the sheet. This compromise, if it may be so termed, was made with considerable reluctance, as we were a little skeptical as to whether we would be able to obtain the required finish on our board. The results, however, have been most satisfactory and we have not had to sacrifice finish; in fact, in some instances, we are obtaining a better finish than before. Felt marks which we were always fighting with the old type primary presses are noticeable by their absence and we are producing a much better sheet in all respects with about 2 per cent more bulk.

Reduced Felt Costs

One of the most important financial contributions for which the new wet end is directly responsible is the reduction of our felt costs which are running some 30 per cent under previous costs. Although this saving is considerable, we are of the opinion that further reductions in felt costs are possible and we are at present experimenting with various types of short bottom felts in an effort to find a felt which will give longer life under the rather severe treatment of the suction rolls. We are, naturally, limited to some extent in the type of felt we can use, as a good finish must be maintained on the bottom side of the sheet.

Although we had anticipated that the new wet end would make possible a saving in furnish cost, we made no formula changes when first starting up the machine as we wanted to see what the results would be with our old formulas. We gradually reduced the sulphite content of our liner stock and our formulas today contain about 35 per cent less sulphite than we formerly used. It would be natural to assume that such a reduction in the amount of sulphite would adversely affect the folding characteristics of sheet, but, as a matter of fact, the sheet we are making today has better foldability than our old board had with the high sulphite content. We have saved many thousands of dollars in furnish costs without in any way sacrificing quality standards and consider it most fortunate that we were in a position to effect economies in sulphite during the last year and a half when the price of sulphite skyrocketed.

The new wet end is extremely flexible. Our production schedules are such that constant changes are necessary and it is a relief to know that we can change from light weight to heavy weight board or vice versa without any evidence of either "checks" or "felt picks." The difficulties we used to experience with old primary presses, slice boards and weight lever adjustments are things of the past. The facility with which changes are now made is directly responsible for the saving of a great many tons of good board, the value of which is considerable.

Drying

Present power plant limitations very materially restrict our drying capacity and we, therefore, could not consider the installation of additional driers in connection with our modernization program. We only have fifteen pounds back pressure at our turbines and this is reduced to eleven pounds at the driers. With our old equipment, we were able to dry 7,000 pounds of bleached manila board per hour and with the same drier capacity and back pressure we are now able to produce 8,600 pounds per hour on the same grade of board. This increase of approximately 23 per cent is due to two factors. The new wet end with its uniflow vats produces an exceptionally uniform and well formed sheet. The suction rolls and vacuum system extract more water from the sheet than was possible under our old system. Our board formerly reached the driers 30 per cent dry, whereas we now deliver the sheet to the driers 34½ per cent dry.

Our experience indicates that the uniflow vats are most efficient when forming not over five points per cylinder; in fact, under our operating conditions we obtain best results around three points per cylinder. We believe, however, that a heavier load could be carried satisfactorily if we were able to operate at a faster running speed. There is no question but there is a definite relationship between speed, freeness and other stock conditions and our recommendation with regard to five points per cylinder might have to be modified to meet operating conditions in a particular mill. Anyone considering the installation of a new wet end should, however, give careful consideration to the number of moulds required, and if much heavy weight board is to be made, we believe that not less than eight cylinder moulds should be provided.

We find that the machine under discussion is decidedly more sensitive to variations in freeness of stock than was our old wet end. In order that we might obtain maximum efficiency from our new wet end, we have devoted a great deal of attention to the preparation of our stock, and largely by trial and error, have determined the proper time cycle with the result that we now have freeness under good control and our No. 1 board machine is operating under as nearly ideal conditions as are possible with the power and steam limitations we have already explained.

Efficiency In Paper Making*

By B. L. Kassing†

Most of us are more familiar with the inefficiencies of paper making than the efficiencies. We are naturally inclined to take good results for granted and forget them. But it is inefficiencies that cause our troubles, and so, we remember them. In order to gain efficiency, it is inefficiencies which must be attacked and corrected.

It would be extremely presumptive for me to attempt to point out your inefficiencies. In the first place, I hope you don't have any. In the second place, I wouldn't know what they are, since it is easily possible that what might constitute good performance for me might be very poor for you. On the other hand, I have had the opportunity to struggle with some inefficiencies and feel qualified, on that basis, to indicate in a general way some methods which have seemed to relieve, if not cure, the condition.

I wish that I was able to tell you how to make two tons of paper where you are now making only one. I would like to be able to tell you what to do to increase felt life by fifty per cent, and how to decrease steam, oil, and power consumption. But as you know, there is no royal road to successful paper mill operation. Increased efficiency results only from a constant study of conditions, and a consistent application of common sense, technology, and hard work.

As a matter of fact the term "efficiency" is seldom applied to paper making. This is, perhaps, just as well because efficiency is a much abused word, and loosely used, it has little real significance. It has, however, a lot of appeal, and is a great catchword. People like things if they are said to be efficient, especially if they are some sort of gadget. Probably everyone of us at some time or other has been stuck with some contrivance or process, which was theoretically perfect but practically a dud.

Technically and in simple terms, efficiency refers to the ratio of the output of a machine to the input. It is usually given as a percentage. Thus, if we put five nickels in a slot machine and get five nickels out, the efficiency is 100 per cent. If two comes out, the efficiency is 40 per cent. If none come out, the efficiency is zero. If we hit the jack-pot and get a hat-full of nickels, the efficiency is way over 100 per cent. On the whole, however, the slot machine averages an efficiency of 30 per cent, and, on this basis, the rest of the nickels, as far as this comparison is concerned, are consumed by the machine.

Input and Output

Now the paper making process has something in common with a slot machine—that is, we put something in it, and more or less comes out. Whether it is more or less that comes out constitutes a large part of our process efficiency. However, in paper making we are concerned not only with the quality that comes out but also the quality of the output. If a slot machine yields a few slugs, we can slip them back in when no one is looking, and the net results is no loss. When a paper machine yields its slugs in the form of hay or broke or off quality paper, we are faced not only with the problem of disposing of it, but also a downright money loss.

Just what constitutes the nickels that we put in paper machines? Well, there are a lot of things, and they are not in the nickel class either. First, we naturally think of our raw materials such as pulps; then our auxiliary materials such as size and alum, colors and fillers; then operating supplies including felts and wires. Next, we may think of the labor employed to operate the process; then power and steam costs, and lubricating costs. Finally, we may think of indirect costs such as clean-up labor, and add in the nickels used up in broke handling, and similar expense jobs. All these, and perhaps others, constitute the input of our process and machines.

If these just mentioned elements constitute the input of our machines, what constitutes the output? This is relatively easy to answer. The output consists of tons of paper of some quality. Tons produced are easily measured, but quality can not be so easily determined, mainly because there are many elements of quality and these quality factors can not be boiled down to one index. This is one reason why we may make a carload of perfectly good paper and eventually find out that it can not be used because it was not exactly what had been wanted in all respects.

Although we have established the input and the output of a paper machine, we are still unable to calculate its efficiency. It is obviously impossible to divide tons of paper of many quality elements by the tons of pulp, size, alum, colors, fillers, the felts and wires, labor, steam and oil that have gone into the process, and get a reasonable answer. How then, may efficiency be measured?

To measure efficiency it may help to think of the paper making process as a long row of slot machines, if I may again use the comparison. We put our nickels in the various machines and more or less comes out of each. Thus our per cent shrinkage or loss of primary and secondary materials indicates efficiency as related to materials. Felts and wires may be figured to an actual cost per ton, as may labor, power, and steam. Costs per ton, however, do not measure efficiency directly, but must be compared with some predetermined cost, based either on past experience or some desired standard of performance.

Standards

To get at efficiency as related to quality, however, requires a somewhat different attack. Here it is necessary to set up quality standards and measure variances from these standards. Such standards may be set on the basis of average performance or on the basis of some as yet unattained quality. Where many qualities are concerned, as in paper, a single quality index is seldom considered. Thus, if a sheet is close to the various standards in use, it may be considered as representing a good delivery.

Today in fine paper manufacture many orders carry a buyer's specification in one or more qualities.

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In such cases it is the rigid control of these qualities which measure efficiency, and production efficiency must frequently be temporarily lowered in order to maintain quality efficiency.

Just now I have mentioned standards both in relation to production and quality. Ordinarily it is only efficiency engineers who refer to standards, the accountant speaks of budgets. The paper maker usually sums the whole thing up by saying that he had a good production or lost a lot of time, tore off a third felt, and made hay all night. Standards or budgets merely give a relative measure of how good or how poor the performance was. They may point out items which may logically be investigated and studied, but they solve no problems nor do they in themselves improve efficiency. Standards and budgets only provide a rule with which to measure or a base line to measure from.

Most people dislike standards, and I am one of them. Nevertheless I have found them both useful and profitable, especially when I can set them myself. This is because, when I arrive at them myself, I understand them thoroughly, and they are in my own language. "Unit costs" and "budget variances" are apt to leave me in a fog. I once listened to an accountant discuss the topic, "Making Budget Reports Speak." To my mind, the problem is to make such reports speak a language understandable to the mill operator who must use them.

"Standards" is a term most frequently used in conjunction with wage incentive or efficiency systems. Although I may mention such standards, it is outside of my field to do more than that. This topic will be covered in this meeting by another speaker.

However, we become aware of inefficiencies what can we do to correct them? How can paper making efficiency be improved? Books have been, and will be written on this question, but the fact remains that all of us have certain limitations with respect to materials, men, and machines. Our problem is usually to make more and better paper at lower cost with what we have. If this can be done or done in part, then we have improved efficiency.

A mill or machine devoted to a single product such as news can be tailored to the job. This is not the case in a specialty mill, where the same machine may make a variety of papers in the course of the day. In such a case, efficiency, both as regards quantitl and quality of output, depends greatly on the personal skill of the operators, capable supervisors and technical control.

Efficiency in paper making begins first in the proper selection of materials, followed by the proper blending and intelligent processing of these materials, and finally by conversion of these materials into the finished paper. Thus, efficiency begins in the pulp mill or the purchasing department if a mill is buying pulp. The presence of a pulp mill in conjunction with a paper mill may have nothing to do with efficiency, but it certainly is a convenience. I have seen everything from wet wrinkles to slitter cracks blamed on pulp mills.

Grade Standards

Assuming an imaginary mill with proper and uniform supply of materials, and reasonably good stock treating equipment of beaters, jordans, pumps, and chests, how can efficiency be improved in stock preparations? I would sum the answer up as follows: 1, Standards, 2. Supervision, 3. Cooperative, intelligent personnel, and 4. Reports.

By standards, I mean standards furnished for each grade. This refers both to kinds of materials and their amounts, and includes standards for treatment. This is nothing new, however, to be effective there must be a written law that furnishes and processing must not be changed without proper supervisory authority. This is very important, otherwise such standards will last about as long as a jordan when a ¾x6 inch bolt hits it.

Standard amounts of material naturally require a measure by weight or volume. Solutions of size and alum must be maintained at definite concentrations. Every effort must be made to maintain uniformity of furnish.

Standards of treatment in beaters and jordans naturally vary with the requirements of the paper being made. Instructions covering such standards may vary from simple description to definite test values to be maintained.

Standards, as employed in the beater room, must also include standard color samples, and standard slowness tests. The necessity for testing, however, can be greatly reduced providing uniform pulp is available, standard furnishes maintained, and processing variables kept in reasonable limits.

Active intelligent supervision must be provided at all times. Such supervision supplies the means of maintaining standards, the extra, experienced brains needed in emergencies, and supplies the authority to deviate from standard furnishes and treatment when necessary. Naturally in the selection of this supervision, care must be taken that those chosen are qualified in all respects for the job.

The Beater Room

The personnel of the beater room is very important. This includes the beater helpers as well as the beater engineer. The higher the level of intelligence, the easier it is to have the importance of standards understood. Further, a high standard of intelligence, even with beater helpers, promotes an understanding of instructions which is very important.

Intelligent people, in my experience, are more cooperative, and cooperation by the members of a beater crew among themselves, and with the machine crew is of inestimable importance in maintaining and improving efficiency. A cooperative personnel is doubly important when wage incentive systems are in use.

A system of reports is of great value in a beater room, but must not be unwieldy. For instance, if it is necessary to increase the rosin sizing, this should be immediately reported so that proper investigation can be started. Likewise, in such a case, such reports indicate how often attempts are made to reduce this important material consumption. Many a pound of size and alum has been wasted simply because no attempt was made to reduce the amount being used.

Beater room standards may be applied to labor. This is usually done in connection with a wage incentive system. This means of increasing labor output or decreasing labor input per ton however is too involved to be considered here.

Now that we have our materials properly blended and treated, we are ready to make paper. Before do-

ing so, however, let's assume that the machine is working on a reasonably well closed system, and that the washout valve to the sewer is shut. This last is important. All sewer connections should be easily visible. Even washout valves have been known to be forgotten or not to seat properly.

Such a machine with an adequate saveall system and water recirculation has low material losses, and, thus, efficiency with regard to materials is fairly satisfactory. It is self-evident that the more a system is closed, the higher becomes its material efficiency, but 100 per cent efficiency can not be obtained unless fresh water enters the system only to the extent that water is lost in drier evaporation. I do not know if this perfect balance has ever been reached, but I do feel that one of the best ways to save materials is to seek ways to cut down fresh water consumption by reuse of white water or clarified saveall effluent. A good rule is to watch your mill effluent both in regard to quality and quantity.

We might continue a discussion of ways and means of reducing shrinkage of materials for hours. Since, however, details of shrinkage must vary with each mill condition we attempt only to point out a basic method of shrinkage attack.

Labor Costs

Labor costs are an important item of conversion input. How can this input in dollars per ton be reduced? Cutting the wages should be a last resort. What then can be done to increase the efficiency of labor, both in respect to quantity and quality of output?

There are probably several ways of answering this question with respect to production, but basically there are only two solutions. The first is to reduce the non-productive time so that more paper is made because less time is lost. The second is to provide means of making more paper by running faster. Both of these are important and must be attempted. Improving the efficiency of labor in respect to quality, however, is largely a matter of education, and making methods foolproof.

Premiums for quality will encourage effort toward quality improvement. To me, however, there is no urge to improve quality which can compare with the self drive of a conscientious, experienced paper maker who takes pride in his job. Furthermore, a large and very important part of paper quality is represented in characteristics for which there is no adequate test. It is very difficult, if not actually unwise, to pay premiums on such a basis.

To return to the problem of increasing efficiency. Both reduction of lost time and obtaining an actual increase in production per hour of actual machine running time may be accomplished by a set up similar to that described for the beater room, namely: 1. Standards, 2. Supervision and inspection, 3. Cooperative intelligent personnel, 4. Reports and 5. Planning.

Standards in the machine room means that we should have standards for machine speeds, and maximum limits for normal interruptions in production such as wash-ups, wire changes, etc. It is well to require explanation of any adverse deviation from these standards. I prefer to require explanation not from the machine tender, but from the tour boss or boss machine tender.

Supervision

This responsibility of the supervisory staff requires it to be familiar with all operating conditions, and actually to supervise. Supervision also supplies the extra judgment and experience which is constantly needed even in the best regulated machine rooms. All responsibility should be precisely defined so that there can be no question of where it begins and ends.

Supervision in the person of the tour boss is absolutely responsible for quality. Some degree of testing is always required. Test results should be promptly reported in writing at the machine. Both beater room and machine supervision should sign these reports frequently, indicating that operating conditions and quality are satisfactory at the time. Any deficiency must be corrected, or proper disposition of defective paper made.

Inspection, both by maintenance and paper making supervision is desirable to prevent lost time. This makes possible proper planning of clothing changes and maintenance jobs so that the least possible productive time is lost. An inspection system, with an attendant simple report form, will do much to reduce expensive breakdowns and sudden failures of equipment.

The importance of the spirit of the machine crew can not be over-valued. Cooperation of crews is highly desirable, and if a spirit of competition between crews can be encouraged without destroying mutual helpfulness, efficiency is bound to increase. In a machine room, team work means much more than a few flashy performers.

Reports and Plans

A simple system of reports will pay dividends. I have found it desirable to have each machine tender report the condition of his machine in writing. This is done simply on an 8½x11 inch form, which lists all the more vulnerable points of the machine. Signature without comment signifies that the points have been inspected and oked. Space is provided for any comment of any point. The report covers three tours, and is collected at 7:00 a.m. each morning by the boss machine tender. These reports will be mentioned again.

A report by the tour boss which is received by his relief makes supervision continuous and makes certain that each tour boss is familiar with what has happened, what may happen, what has been done, and what may have to be done. Such simple reports are a great help in locating that mysterious tour that makes most of the calender spots, winder wrinkles and other usual defects.

You will notice that I mentioned planning in connection with paper machine efficiency. This may not be necessary in a one product mill, but in a fine or specialty mill it will more than pay for whatever it costs.

The amount of planning required will depend largely on the diversity of grades, colors, weights, and sizes made, and the amount carried by the mill, and ordinary service requirements. Planning should be, to some extent, independent both of sales and production, but must consider manufacturing from the standpoint of production, and sales from the standpoint of service. This is because there is always someone who has to have a standard item with the grain just contrary to that customary. Usually it must be made and shipped when the machines are making something else.

Planning includes the scheduling of colors and

grades in such order that the minimum changes are required, and that maximum deckles are obtained. These things are of extreme importance in those mills making a diversity of grades.

These things I have mentioned refer to general or over-all efficiency. How about the nickels and dimes which disappear in felts and wires, in steam and power and oil, in broke and defective paper? If we could forget these, paper mill superintendents would be better golf players.

These last items are most easily calculated to a cost per ton basis, and it is important that this be done. Such costs are bound to vary widely from mill to mill, and machine to machine. Nevertheless, it is possible to generalize to some extent in each case.

With steam, we should first avoid waste by leaking valves or radiation; second, endeavor to obtain the highest possible dry test leaving our presses; third, recover condensate; fourth, use drier felts which assist drying rather than hinder the process.

With lubrication costs, it is worth while, even in a moderate size mill, to have one individual systematically study the problem. Usually more effective lubricants can be obtained. Further, the wasteful bearings and detected and the conditions corrected.

Power costs usually represent a considerable part of conversion costs. Reduction of such costs, however, is a problem usually requiring some engineering, and frequently a capital outlay. It is a highly specific problem, and generalizations about it are of little use. Each opportunity of power saving must be studied and decision made purely on the basis of the economies of that particular situation.

Machine Clothing

How can better service be obtained from clothing? First, consider a wire, which is probably the most delicate and costly of the various clothing items, especially if total costs of installation are considered. As baffling as the wire problem is, some things can be done, which, on the average, are well worth while.

First, it is necessary to obtain an honest answer to the question "What caused the failure?" To this end, I have found it advantageous to examine a strip from every wire when removed in addition to any crack, bung, sewed spot, or other defect. This has led me to the conclusion that by far the most wires finally fail at a point where excessive wear has occurred due to a bung of some sort. The problem is then to eliminate the cause of such bungs. Whatever the cause of failure the problem can be attacked intelligently only if we first decide on the cause.

Second, boss machine tender's and machine tender's reports by revealing when and where cracks occur, may indicate that some wires are more apt to fail than are others. Such reports may also indicate a chronic machine condition, causing localized wear or failure. A complete chronological record of wire service is invaluable in studying wire service.

Third, it is desirable to examine the fourdrinier frequently for rolls out of level or out of line. At the same time, we should look for defective roll coverings and poor bearings.

Fourth, efforts must be made to reduce friction on the wire, particularly at suction boxes. Slippage of the wire at the couch is also a serious point of wear

Fifth, a complete record of wire service should be compiled in order that differences betwen wires and machines can be detected and studied. Such records, eventually become a valuable service index, similar to insurance mortality tables. These records, plus a close examination of any wire in question, should help in deciding when and where it is a reasonably good chance that an extra week's service can be expected. This is important because, unless a full week's run can be obtained, it is usually false economy to try to get the last few days' service.

Analysis of such data, from my own experience, may be done simply and in such fashion that a graphic picture may be obtained which is easily understandable by anyone. Such a graph has shown the long bets that were frequently made in trying to get that extra week of service, and how much more often we lost this bet than won it. Further, the data demonstrated that we should worry more about eliminating the mysterious failures after only a short service and not be overly concerned in obtaining runs beyond the normal expectancy of our daily average.

Press felt service should be studied exactly as suggested for wires, even though felt costs are lower than wire costs. Close examination of felt samples frequently indicate a chronic condition at some point. These conditions can only be found and eliminated if they are first discovered.

Machine tender reports are of great value in improving press felt service. Felts rarely give out suddenly as do wires, and a daily report of their condition and working quality is of great aid in studying their service. Further, such records frequently indicate a detrimental condition before too much damage has been done.

A word should be said about felt washing. The necessity for doing this varies from once a week, perhaps, to every day. This problem is worth some laboratory investigation. Remember that a dirty felt can not be efficient, and that a felt washed clean, even though some felt life may be sacrificed in so doing, will in the long run be the cheaper. The problem of washing varies greatly from mill to mill, but, from my own experience, I can say that it is better to use a strong and efficient cleaner at temperatures below 110° F. than a mild cleaner, which can not attack wool.

Drier felt costs are important. Proper ventilation of drier felts will increase their life. Felt driers are a good investment from the standpoint of felt life. We seem to be on our way to a solution of the seam problem, and this, in itself, should materially reduce drier felt costs.

A device which has helped in improving clothing service is the preparation of a budget sheet for clothing. This is not made up as dollars to be spent, rather, it is a schedule showing the date when clothing is expected to be changed. Let your machine crews see how close they can hit the date for each change.

Still another thing which has helped in reducing clothing costs; a point so simple that it may be unnecessary to mention it: *Aquaint your crews with the value of clothing and its cost per day and per ton.* This simple device has promoted a greater respect for clothing, and led to more care in handling and using it. By working up such information in interesting form, machine help will be more cooperative in helping to reduce clothing costs.

Broke

There is one more general point, the study of which will improve efficiency. In this, I refer to the desirability of reducing the amount of broke made. This is quite a difficult problem, but usually some improvement can be made.

Before tackling the problem, it is obvious that we should first determine where the broke is made and whether it is legitimate broke or just plain hay. Legimate broke consists of the necessary winder trim, or broke made in changing weights, colors or finishes. Other broke is illegitimate and it is this class of broke which must be studied. In this connection, I might mention that excessive trim necessitated by grainy edges should be considered as illegitimate broke.

Even after we know just what the problem is, the reduction of the amount of broke is apt to be difficult. Certain defects may indicate that certain things need attention. Sometimes, an answer is found in a left-handed backtender on a right-handed machine. Usually the machine crew can be of help in offering suggestions as to broke reduction and, in my experience, crews will make an honest effort to reduce avoidable waste of paper.

There is still another type of inefficiency which many of us at times may experience. I refer to those defects or faults which are indicated after the paper is made. Such faults may show up in the finishing operation or even much later in the hands of the user or consumer. This type of inefficiency is an exceedingly hard one to handle.

It is first important that we be able to identify our papers, not only in our own finishing room, but even when the consumers have it. Such identification plus the necessary records make it possible to track back any faulty lot, not only to the machine that made it, but also to when it was made. Knowing this, we then can check the furnish used, and control tests made. Records of the circumstances of manufacture frequently provide some clue as to the cause of the fault.

Naturally it is desirable to obtain a fair amount of the paper concerned for inspection and testing. With these samples, we should also obtain a complete and accurate description of the conditions under which the fault appeared, whether the fault was constant for the entire lot, etc.

From the inspection and the nature of the fault, usually some idea of the cause can be obtained. The hard part, of course, is to guard against a recurrence, and to do this may require extensive research, new methods of testing, or tighter inspection. The necessity for such steps, of course, must depend on the entire circumstances.

In conclusion, it appears that increasing efficiency in a paper mill is no simple task. The very nature of paper, the raw materials, and processes used, preclude such a condition. The diversity of circumstances met with make it impossible to reach perfection, so we will probably have our bad days for some time to come.

On the whole, however, slowly but surely efficiency is increasing. It will continue to increase as we think more do more and exchange ideas. No one could possibly live long enough to experience and eliminate all the possibilities for inefficiency, so that we must profit by the experience of others. Sometime the 100% efficient paper mill will be built on the foundations now being laid by today's paper-makers.

Screening Pulp Fibers *

By Nelson M. Knight [1]

The substances detrimental to the making of paper should be removed from the pulp fibers before their final conversion into sheet form. There are several different processes which accomplish this operation very successfully, but screening is the most generally used. With this in view, we concentrated on ways and means of screening pulp so as to produce a clean fibre with reasonable production and at low cost per ton.

We did not start with just a mechanical idea; first, we studied pulp characteristics and mechanical screening, then fitted the mechanical units to conform with each stage of separation until we had successfully completed a screen which we believe to have all the qualities just mentioned. This has taken several years of research and development work which was made possible by the whole hearted cooperation of some paper manufacturers in our behalf. We are offering some of the accumulated data in the hope that it may be of some value to the industry.

Dirt in Pulp

First the study of substances to be removed from the fibres was necessary to get a clear picture of pulp in its primitive state. The substances were too numerous to name but can be divided into three classes, which are: those of a higher specific gravity than pulp fibers, those of the same specific gravity, and those of a lesser specific gravity. For general use I am to refer to all three as pulp enemy No. 1, *"dirt."* All these particles have their own characteristics, but do not always react the same under screening pressure, for example; a knot or bark speck which has been subjected to a high concentrate of acid while cooking is apt to be of a spongy nature when discharged from the digester and will be compressed by excess screening pressure through a slot or perforaation that is slightly smaller than itself, while larger particles will become lodged in the plates. On the other hand, this same type of dirt may be of a hard nature and will break up easily to become so fine that it will pass any screen plate. Another type of dirt is the shive with usually the same specific gravity as the fibers with which they are in constant suspension, they also are of a spongy nature and sometimes of considerable length, having fiberous tenticles that cling to the pulp fibers. These qualities make the shive hardest of all types of dirt to separate from the fibers. I am not going any further in relation to the characteristics of dirt, but

* Presented at the annual convention of the American Pulp and Paper Mill Superintendents' Association, Toronto, Ont., June 22-24, 1938.

[1] Mathewson Machine Works.

wanted to point out these two cases as they have a definite bearing on other findings.

The screen plates must at all times be kept clean. Once a particle of dirt has been introduced to the slot or perforation it must immediately be removed, otherwise it may be forced through or become lodged there. If this continues the efficiency of the screen is reduced because of the dirt obstructing the area through which the good fibers are to pass and eventually the screen will be producing only a fractional part of which it is capable. Not only that, but the dirt of the spongy variety has every chance of being forced through if acted on more than once by the screening force. It was because of this that we found that the proper application of pulsating stock through the screen plates, as in a flat screen, produced excellent results.

Suction

A pulsation generates two actions, one which draws the fibers through the plate and the reverse, which partially dislodges any particles of dirt that may have become involved with them. This not being sufficient in itself it is necessary to have some other means to complete the operation. We found numerous ways of doing this; namely, mechanical pressure, scrapers, water, and suction. We chose the latter as it seemed best qualified for this unit of operation. Mechanical pressure and scrapers are detrimental to the plates and have a tendency to break down the dirt, water will dilute the stock and is an added expense to operation. Suction, on the other hand, has a fairly mild action and draws the dirt away from the plates without contacting them.

In our particular case we generate the suction by mechanical means within the screen so that each and every slot or perforation is thoroughly cleaned after each screening pulsation. Much of the dirt is eliminated by this process. The application of this unit is efficient and requires very little power. It is made up into a series of so-called runners which encircle the outside of the screen cylinder. The design is such that by rotating the runners slowly a vacuum is created on the underside of each, drawing the dirt away from the plates, the following runner picks it up on its outer surface and rejects it back to the supply chamber from which it came, to be carried by natural flow or gravity to the rejection chamber of the screen. Because of the particular characteristic of the shive it will stay in such close proximity to the plate that it is necessary to use other means than the natural flow to reject it from the screen; this is done by placing a series of deflectors on two of the runners, causing a downward flow of any belated dirt particles.

The position of screen plates play an important part in screening. If the plates are of cylindrical design there is but one logical position in which they can be placed to reduce the possibility of dirt coming in contact with them. That position is vertical. With the plates in this position the dirt is free to settle or flow past them of its own accord without contacting them at any given point. By totally submerging this screen cylinder the maximum screening efficiency is acquired.

The consistency of pulp in most cases has a fairly wide range and has been screened through perforated plates at over one per cent consistency. During the experiments with this screen we found that by running consistencies in the vicinity of 0.5 per cent the quality of the accepted fibers was greatly improved over that of higher consistencies. On the other hand, if the consistency is greatly under that of 0.5 per cent, dirt will be more prevalent than at any other time. The size of the slot of perforation will determine this to some extent. In screening at high consistencies the fibers are so closely matted about particles of dirt that separating becomes more than a screening problem. The slots or perforations will have to be large enough to let them pass or else they will be drawn to the plates with the fibers and have to be literally torn loose that the fibers may be freed. The force necessary to penetrate to the dirt so as to free it from the fibers, will most always break the dirt by so doing. We found that maintaining the consistency at around 0.5 per cent the screening action could be used to its fullest advantage. It is necessary to keep the slots or perforations filled with the proper amount of fiber so as to help restrict the passage of such dirt as might pass through too freely.

Slotted Screen Plate

For the moment I am going to disregard the perforated screen plate as what I have to say will in effect be essentially the same with the perforated plate as is true of a slotted plate.

In pulsating stock through a screen plate it would pass through the slot in the form of a sheet, but in reality the formation is broken up by the volume of stock and water on the side of the plate to which it is being transferred. Assuming that the dimension of the slot is ten thousandths of an inch cut and the length is one and one-half inches, the sheet of stock and water to pass will be ten thousandths of an inch thick, one and one-half inches wide and the length determined by the amount of liquid to pass through the slot at one suction stroke. In some cases this length will figure theoretically as high as three quarters of an inch in length. This means that dirt of the right nature whose dimensions are smaller than that of the slot, but are three quarters of an inch long, could pass through at one suction stroke; however, this seldom if ever happens because of other elements that would distort it in its course of travel, but proves that dirt of considerable length can pass the screen plate because of this condition. To decrease the length of liquid sheet necessitated increasing the pulsations per minute, at the same time it decreases the length of time that the dirt particles contact the slots. By reducing the length of the liquid sheet to three-sixteenths of an inch we have had very satisfactory results.

When using slotted screen plates we found that the position of the slots in relation to the flow of stock had its advantages for retaining the dirt. If the slot is parallel with the flow and the slot is one and one-half inches long, the dirt has one and one-half inches of travel to contact the slot, whereas, if it is at right angles and the slots are ten-thousandths of an inch cut, the dirt has only ten-thousandths of an inch travel to contact a particular slot. This has a tendency in some cases to reduce the capacity to the point where it is prohibitive from a production standpoint.

By installing the mechanical screening element on the side of the screen plate with the accepted fibers, the hazard of breaking down the dirt is reduced. By experimenting we found that this screening element

will produce best results if it were not of a positive nature, in other words, if the pulsation is drawing the fibers through the plates they tend to collect around the slots or perforations, creating a film of pulp around the plate through which the water tries to pass because of the freeness of the raw pulp; however, the screening force is great enough to keep the fibers in suspension. It is surprising the change of consistency that takes place at the plate with each pulsation caused by the matting of fibers when screening raw stock. Because of this condition the film thus collected is always changing with each pulsation. When this film becomes too great the pulsation has no way of relieving itself and creates an excess screening force to the fibers which will tend to draw the dirt through with them. We compensated for this by mounting our screen cylinder on rubber so that the force created by the pulsation delivered part of the load to the screen cylinder, which, in turn is transferred to the rubber; the rubber serves as a relief for the excess pressure and will only draw the desired fibers through.

Slime Removed

Voiding slime conditions is an important factor, not only in screening, but throughout the entire system. Fibrous particles clinging to the slots or perforations will collect other fibres which absorb impalpable substances forming a stringy slime condition on the accepted side of the screen plates, these break loose periodically when becoming large enough. By maintaining clean slots of perforations at all times, slime is eliminated from the screen plates.

Having the mechanical pulsation element located on the accepted side of the screen plate also is an assurance against slime. The agitation created by the pulsators is so great that it is impossible for slime to collect on any parts within the screen plates. On delivering the stock free of slime from the screen, it should maintain that condition throughout the entire system. If boxes or troughs are used the corners or joints provide natural hazards for trapping substances to form slime. Piping, however, is an excellent means for transmitting pulp because of its round and fairly smooth surface, it also insures against foreign dirt entering the system and helps to keep equipment clean.

We have provided standard pipe fittings to all stock connections so that piping can be used if desired by the customer.

There is much more can be said in relation to screening but inasmuch as the most important features have been touched on, would like to take a few minutes to point out some features of this particular screen.

The stock heads of the screen are controlled by gravity flow. The accepted discharge head will be several inches lower than that of the supply. The approximate heads will depend on the grade of stock being screened such as sulphite, sulphate, soda or ground wood. The rejection head will remain fairly constant in all cases and approximately the same height as the supply head.

These heads in relation to their heights will often serve to advantage. The slight difference in heights can be arranged to save the pumping of stock. The rejection head will always be high enough to supply a tailing screen placed in line and at the same level as the first screen, which will supply it by gravity flow.

The screen is equipped with a 25 h. p. motor, which is in excess to the power consumed. In most cases the power will be 20 h. p. or less. We have not had a wide enough operating range under actual mill conditions to say definitely the power will not run in excess of 20 h. p.

As far as operating the screen under actual mill conditions, our activities have been confined to screening sulphite brown stock. We have, however, screened most grades of pulp through a laboratory screen with which we have done experimenting. When using the same pulp in the laboratory as was being screened through our screen in the mill the results checked very closely.

The capacity of this screen will change to some extent in different mills if quality is to be maintained, mainly because of the variation in freeness of the fibers.

The capacity of this screen on sulphite brown stock equipped with a .012 cut slotted plate will be about twenty-five tons per twenty-four hours, consuming less than 20 h. p. This screen on the same stock equipped with .055 perforated plates, will be about seventy-five tons per twenty-four hours, consuming about 20 h. p.

The rejections in all cases will run from 1.5 to 2 per cent of the supply.

Effect Of Starch On The Printing Quality Of Board*

By A. Yraola[1]

The use of starch to improve certain qualities of paper was known to the Chinese and Arabian papermakers of the eighth century, who used starch to size their paper to writing inks. Previously the Egyptions and Romans used starch in the form of flour as an adhesive and sizing agent in the manufacture of papyrus. The use of starch in paper continued until the fourteenth century when it was replaced by glue as a sizing agent. In the nineteenth century after the invention of the paper machine starch again came into use in almost all grades of paper and board as an assistant to rosin in sizing, to improve smoothness and feel and prevent fuzz, and to improve the snap of the sheet.

New advantages obtainable by the use of starch in board have been found to meet conditions imposed

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[1] Member TAPPI, Chemist, The Hinde and Dauch Paper Company of Canada Limited, Toronto, Canada.

by development of the last year and a half in the carton printing industry of high gloss inks. The vehicle of high gloss inks is based on the new synthetic resins and is much more tacky than the linseed or tung oil base formerly used. Due to the tacky or adhesive nature of the vehicle in high gloss inks the liner of the board must be harder than usual in order to prevent the ink from pulling fibers loose during printing and making the finished print job rough and hairy instead of smooth and glossy. If the board liner is not hard enough three faults may occur on high gloss printing, one of which is fuzzing or picking of the liner. Another is mottling, caused by partial loosening of the board surface and uneven absorption of the ink into the board. This is especially noticeable on large areas of solid ink. The third is excessive absorption of the ink into the board, which destroys the gloss.

Improves Hardness But Decreases Oil Absorbency

Starch used in the liner furnish in amounts greater than usual for ordinary grades of printing board improves the hardness or pick test, and decreases the oil absorbency sufficiently to produce a satisfactory result with high gloss ink. The effect of addition to the beater of starch is indicated by pick test obtained with standard paper testing waxes. The liner of No. 1 patent coated, No. 2 patent coated or bleached manila made without starch would have a wax pick test of about 12 to 14. Addition of one per cent of starch to the liner furnish raises the wax pick test to about 16 or 17. We have found that one per cent of beater starch produces a very smooth sheet, sufficiently hard for letterpress printing with standard inks.

Addition of two per cent of starch to the liner furnish raises the wax pick test to between 20 and 23, and makes a noticeable improvement in finish. A sheet of this wax test is sufficiently hard to withstand high gloss inks very well. The oil absorbency of the board is lowered to such an extent that ink drying may be greatly slowed up unless the ink has been made or adjusted for a board of this type, due to the fact that most boxboard inks dry to a great extent by absorption, and any interference with the normal absorption demands that more of the drying be done through oxidation than the ink is made for. It is for this reason that we make boards for use with regular letterpress inks with one per cent of beater starch in the liner and boards for use with high gloss synthetic resin inks, which need not be greatly absorbed, with two per cent starch.

More than two per cent starch does not seem necessary to produce a board that will meet satisfactorily any condition of high grade carton printing, under our mill conditions. It is probable that if much more than two per cent starch were used special inks would have to be made up to obtain satisfactory results in regular operations. These results were obtained with corn starch boiled before adding to the beater.

Calender Starch

Calender starch has a definite effect on the feel and gloss of board liner, and application of calender starch can eliminate loose fuzz and improve resistance to scuffing. The improvement of finish and feel accomplished by calender starch justifies its use for these reasons. It also has an effect in decreasing ink absorption, but it does not add enough resistance to stresses vertical to the board surface to prevent picking of the board liner by high gloss inks or other similar conditions in cases where the board liner coming over the machine is not sufficiently strong and hard.

Control of the resistance to picking of the board by the use of the necessary amount of starch in the beater for the printing conditions the board must meet make it unnecessary for the board mill operators to lower the folding quality or any similar property of the sheet to obtain a liner sufficiently hard or non absorbent to ink to produce a satisfactory printed job. This property is especially valuable in cases where the printed carton is to have solid ink on the crease lines. When a definite wax pick test is desired for some printing requirement and is obtained on the machine it can be maintained at a constant level by consistent furnish, uniform beating and jordanning, and uniform machine conditions.

In addition to the use of high gloss inks there have been other recent developments in the carton industry such as increased speeds, all over varnishes, and the increasing use of offset presses. All these uses for boxboards impose more severe conditions of picking on the liner of the board. Overprint varnishes are in general more tacky than the ink used on a given job, and if the board liner is not resistant enough to picking, or in other words is too soft, the varnish will lift or pluck the surface in tiny patches or tufts all over the sheet, and will affect the appearance of the printed areas as well as the plain board.

Offset presses in general use a more tacky type of ink than letterpresses and therefore require a harder surfaced board. As the speed of offset presses is increased the inks used must be made more tacky to retain a clear sharp impression, and this combination of tackiness and high speed calls for board with the hardest type of surface. Board with a wax pick test of 20 or more is suitable for this class of work.

Not long ago a situation involving excess acidity arose in connection with a large order of board being printed on a high speed offset press. We found that to make a board sufficiently low in excess acid the liner pH on the machine should be about 6.0. Where too much alum is used acid from the board finds its way back to the fountain, where the acid attacks the zinc plate and counteretches it. This effect is not noticeable until three or four thousand sheets have been run.

These observations are the result of our experiences in the carton plants we supply. No doubt members present have had other experiences varied by the conditions prevailing in their plants.

France Increases Pulpwood Production

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., June 29, 1938—Production of pulpwood in France is increasing at the rate of about 100,000 cubic meters annually, having grown from 350,000 cubic meters in 1925 to 500,000 cubic meters in 1937, according to reports from the office of the American Consulate, Nantes. Estimates place the production of pulpwood in France at 680,000 tons in 1938.

At Strasbourg where a large pulp mill for the utilization of Alsatian fir recently commenced operations, there has been great difficulty in supplying the mill promptly with the quality and form of wood needed and it will obviously be necessary to educate timber owners as to the needs of a pulp mill.

Particle Size Distribution As It Affects Properties Of Coating Clays*

By S. C. Lyons[1]

The increasingly rapid development of machine-coating, or so-called "process coating" methods, has necessitated far-reaching developments in the technology of clay refining. Not only have new clays of greater whiteness and brightness been produced, but also methods of controlling particle size to an extraordinary degree of uniformity have been worked out by some of the leading domestic clay manufacturers.

As a consequence such clays now become in the true sense of the word, "process-controlled pigments" because they are chemically and physically treated by precision methods. No longer is the consumer faced with inequalities occurring in the raw clays which cannot be successfully controlled in a partially treated product.

Causes of Variations Formerly Obscure

Papermakers and clay producers have long been perplexed by the fact that clays from different sources which appeared to possess physical and chemical properties closely parallel, frequently behave quite differently during the coating process, and, in fact, yield finished sheets of disconcertingly different quality.

Sometimes one clay would yield a coating suspension or "color" of highly fluid, free flowing character which would spread well; while another clay, of comparable brightness, screen analysis, etc., would produce a "color" of rubbery, viscous nature. Chemical analyses and other recognized tests would frequently indicate very little, if any, difference between the two clays.

Occasionally, the papermaking qualities of a clay from the same source, and prepared in the usual manner, would show unexpected and unfortunate variation in working properties, for no apparent reason.

Research Identifies Causes

Within the last 5 or 6 years, intensive, basic researches conducted by some of the leading U. S. clay producers, have begun to throw light upon certain features of the fundamental nature of clay. In turn, these have revealed many of the causes of the baffling variabilities above mentioned, and have pointed the way to the production of coating clays possessing qualities heretofore considered unattainable.

Importance of Particle Size

It has been found, for example, that the particle size distribution of a clay more profoundly affects its qualities as a paper coating pigment, than any other of its properties. This may sound like a rather broad statement, but careful and repeated tests support its validity.

Perhaps some effects of particle size can be made clear by considering water in its various stages of aggregation. A block of ice is not white. If it be roughly crushed, it will still not be white, but it will be whiter than the original block. If, however, it be ground up as fine as snow, it will look very white. A reverse form of this experiment may be performed with a glass beaker full of pure water. It will be colorless. If it be poured upon a hot stove, it will assume the form of vapor which will be invisible because its particles are even smaller than the shortest wavelengths of visible light. If, however, this steam be cooled so that its very fine particles coalesce to form somewhat larger ones, it will appear as white fog, or steam. These fog particles could be further coalesced to form larger drops, like rain, which would not appear as white as the fog. In all cases, it is seen that the particle size, if we may use this term with respect to water, materially affects its appearance.

In the first place, it should be borne in mind that, throughout this discussion, only particles smaller than 325 mesh, i.e., about 40 microns average diameter, are considered. A clay for paper coating should contain no more than a trace of material coarser than this.

For convenient reference, we have designated those clays containing a majority of particles between the limits of 40 microns and 10 microns as "coarse" clays. Those containing a preponderance of particles between 10 and 2 microns are considered "Intermediate", and those finer than 2 microns are regarded as "fines". In testing a wide range of clays we have found a substantial portion of the fine fraction to be of particles finer than 0.3 micron and in some cases as low as 0.1 micron in diameter. Since a micron is roughly equivalent to one twenty-five thousandth of an inch it will readily be seen what is meant by the fine fraction.

Particle Size of Clay Affects Color of Coated Sheet

The basic importance of this matter of particle size distribution to the paper coater can, perhaps, be well expressed by saying that if 3 samples of clay, each of identical color and chemical composition—but of different particle size, i.e., "coarse", "intermediate", and "fine"—be made up into coating "color" with casein, brushed out on sheets under uniform conditions, and dried,—the resulting coated sheets will not be alike.

They will vary, not only in texture, finish, and opacity,—as might be expected,—but also will vary markedly, and progressively, in "brightness" and "tint" or spectral distribution.

"Fine" Clays Give Coated Sheets of Best Color

When using casein as adhesive, and coating ordinary raw stocks which are not very white, the

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* Presented at the annual convention of the American Pulp and Paper Mill Superintendents Association, Toronto, Ont., June 22-24.

[1] Georgia Kaolin Company, 230 Park Avenue, New York.

"coarse" clay would yield sheets lower in reflectance and more "yellow" than the others.

The "Intermediate" clay would produce sheets of slightly better reflectance and color "distribution", i.e., "whiteness".

The "fines" would give brushouts whose brightness and whiteness would be superior to those from either the "coarse" or "intermediate" clays.

Coarse Clays Stand Calendering Best

By methods mentioned below, it was found that when the sheets were calendered, their color was affected in reverse order. That is, the "coarse" clays suffered less loss of brightness than did the "intermediate" clays, while the "fines" suffered most.

Moreover, the "yellowing" of the sheets under calendering was more pronounced in the case of those coated with "fine" clays, whereas the "coarse" ones were affected least.

TABLE I
COMPARATIVE REFLECTANCE OF CLAYS & BRUSHOUTS THEREFROM
(Brightness taken at 400 mu)

Nature of the Clay	Reflectance of the Clay Per cent	Loss in Reflectance of Brushout Therefrom Per cent	Further Loss Upon Calendering Per cent
Fine	71.5	2.2	4.3
Intermediate	69.0	9.0	1.5
Coarse	68.0	10.5	1.0

The foregoing table shows numerically that "fine" clay brushouts hold their color best before calendering, but that "coarse" clay brushouts suffer less during calendering.

Fine Clays Show Less Total Loss of Color

None the less, the final color obtained from the sheets coated with "fines" was invariably better than with the "coarse". That is, the combined loss in color during the brushing out and the calendering was, in every case, less for the "fines" than for the "coarser" clays.

It was rather striking to see how several of the coarser clays used in the tests, which also happened to be whiter than some of the finer ones, yielded calendered sheets of definitely poorer color.

Effect of Particle Size on Finish

The effect of fine particles on finish is so generally recognized we do not feel it is necessary to go into a detailed discussion on this point, but in passing, we mention that it is the most important factor contributing to high finish, recognizing there are other factors which also are important.

Behavior of Clays of Heterogeneous Particle Size

Clays of heterogeneous particle size, such as some of the imported grades, behaved as might be expected, in the light of the foregoing. Containing one component of relatively coarse particles mixed with a very fine fraction, they showed color losses of moderate magnitude, both before and during calendering. Their combined loss was about comparable with that shown by the "coarse" clays described herein.

TABLE II.—EFFECT OF PARTICLE SIZE OF CLAY UPON WHITENERS OF COATED SHEETS
Difference between Reflectance at 400 mu and 700 mu

Nature of the Clay	Clay Diff. Per cent	Brushout before Cal. Diff. Per cent	Brushout before Cal. Increase Per cent	Brushout after Cal. Diff. Per cent	Brushout after Cal. Increase Per cent
Fine	17.5	19.1	1.6	23.4	4.3
Intermediate	22.0	26.6	4.6	28.1	1.5
Coarse	19.0	28.2	9.2	29.2	1.0

This table shows numerically that "fine" clays produce the whitest brushouts and that "coarse" clays lose less whiteness by calendering.

From the foregoing, it will be seen that the particle size distribution of coating clays is a factor of utmost significance to the coater.

Miscellaneous Studies of Particle Size

Tinctorial value—The spectrophotometric curves shown in Figure I, below, demonstrate rather strikingly how delusive may be the raw color of a pigment as an index to the color of product which it will yield, provided its particle size is not also taken into consideration.

A sample of very white talc was first color-analyzed by the spectrophotometer; next, a sample of filler clay was likewise measured (both of these shown by enlarged photomicrographs). In this test, bear in mind the talc was of much whiter color than the clay, but as shown by these enlarged photomicrographs the talc was characteristically of a much coarser particle size. Then a 50-50 mixture of the same talc and clay was similarly measured. The resulting spectrophotometric curves show very graphically that the "tinting strength" or "hiding power" of the clay is much greater than that of the talc. Had they been of equal tinctorial power, the graph of the 50-50 mixture would have been equidistant between the corresponding values for the talc and the clay. Likewise it has been found with this same method that an equal mixture of very white calcium sulphate, which is characteristically coarse, and a fine particle size clay will show similar results. Further experiments show that when using a pigment with as fine a particle size as titanium which is, we know, considerably finer, than that of clay, a mixture of 90 per cent clay and as little as 10 per cent titanium the color of the composite is materially raised because of the effect of the smaller particles.

Use of the Hardy "Color Analyzer"

In making the tests upon which the above deductions are based, the color of the clays and the coated sheets prepared from them was quantitatively determined by means of the Hardy Spectrophotometer or color analyzer. This is an instrument which measures, automatically, the light reflectivity of a sample at every wavelength within the limits of the visible spectrum, i.e., between 400 mu and 700 mu, and records its readings in the form of a graph. It is a null instrument, consequently, variations in its photo cells, etc., do not affect its accuracy. We have found, from hundreds of tests with it, that it is amazingly trustworthy.

The evaluation of the comparative color values of white sheets such as these, without the aid of such an instrument, is a most confusing and uncertain process. With it, however, the numerical reflectance values to be compared are merely read off the spectrophotometric curves, and a direct and quantitative comparison of the color of the sheets is very easily obtained.

In presenting this brief paper we have endeavored to confine our remarks regarding particle size primarily as it affects coating. The principles set forth we believe will apply equally well with any coating pigment used such as calcium carbonate, calcium sulphate, zinc sulphide, titanium or clay.

Historical Green Bay to Welcome TAPPI

Hospitality, for which Green Bay, Wis., is famous, will be enjoyed by more than 800 visitors during the fall meeting of the Technical Association of the Pulp and Paper Industry September 8, 9 and 10.

Green Bay is called the "Boston of the Middle West" because of its wealth in early Northwest Territory history and authentic historical places. It is also called the "Plymouth of the Middle West" as here came the first white man just 14 years after the Pilgrim fathers first set foot on Plymouth Rock. This was exactly 304 years ago this summer.

Much of the quaintness and historic romance of the early Creole days still remains in and about Green Bay. The city is busy with trade, industry and commerce but here and there, tucked away in almost forgotten corners can be found settings that will carry you back to the days when Jean Nicolet made his historic landing in Green Bay, in the year of 1634.

Green Bay has all of the facilities of the ideal convention city—hotel accommodations are of the best with numerous restaurants offering choice menus for which Green Bay is widely known. Three railroads and a network of paved highways provide adequate transportation facilities for all visiting members of TAPPI. Convention headquarters will be at the Northland Hotel. Rooms in other hotels have been set aside for visiting delegates. Those planning to attend the Fall Meeting should make reservations as soon as possible through Mr. A. D. Murphy of the Green Bay Association of Commerce. These should be made immediately.

Invitations have been sent out this week to machinery and paper mill supply manufacturers to exhibit their products at the Northland Hotel during the Convention. Display places are all ideally located to obtain maximum attention. Rates are very reasonable and early reservations through R. D. Cord, Northern Paper Mills, Green Bay, Wis., are suggested to avoid disappointment.

Entertainment for the ladies is in charge of Mrs. H. W. Gochnauer. Golf, bridge, numerous sightseeing trips and theatre parties are planned. For the men the "Program of Fun" will be endless with fishing, yachting and golf at Oneida, one of the sportiest courses in the Middle West, making up the chief points of attraction after business sessions are over.

A very complete and thorough technical program is also being arranged by the committee in charge and every effort is being made to make the Green Bay fall meeting unusually interesting so that attendance at the convention will be profitable to all TAPPI members and others who may desire to attend.

Dr. Jessup on Johns-Manville Board

With the election of Dr. Walter A. Jessup to its board of directors the Johns-Manville Corporation is marking a policy, according to Lewis H. Brown, president. It will be to widen the scope of the board's membership to include not only the interests of the stockholders but the viewpoint of the public as well. Since December 12, 1933, Dr. Jessup has been president of the Carnegie Foundation for the Advancement of Teaching. He succeeds Clarence M. Wooley on the Johns-Manville directorate.

AIRPLANE VIEW OF GREEN BAY, WIS., LOOKING NORTH WHERE THE FOX RIVER FLOWS INTO GREEN BAY AND THENCE INTO LAKE MICHIGAN.

Imports of Paper and Paper Stock

Giving Manifests of New York, Boston, Philadelphia and Other Ports, of Newsprint, Wrapping, Writing, Coated, Blotting, Tissue, Strawboard, Wallboard, Cigarette Papers, Sulphite, Kraft and Ground Wood Pulp.

NEW YORK IMPORTS

WEEK ENDING JUNE 25, 1938

SUMMARY

Cigarette paper .....19 bls., 17 cs.
Wall paper .....3 bls., 1 cs.
Wall board .....150 crates
Paper hangings .....1 ble., 1 cs.
Newsprint .....5,639 rolls
Printing paper .....3 cs.
Packing paper .....36 bls.
Drawing paper .....5 cs.
Filter paper .....9 cs.
Filter compound .....75 bls.
Filter pulp .....10 bls.
Filter mass .....30 bls.
Surface coated baryta paper .....13 cs.
Surface coated paper .....69 cs.
Photo paper .....3 cs.
Metal covered paper .....4 cs.
Basic paper .....6 cs.
Decalcomanias .....12 cs.
Tissue paper .....27 cs.
Tracing cloth .....7 cs.
Gummed paper .....5 cs.
Letter paper .....1 cs.
Envelopes .....1 cs.
Paper tubes .....68 cs.
Miscellaneous paper .....49 cs.

CIGARETTE PAPER

De Manduit Paper Corp., *Ile de France,* Havre, 2 cs.
Braunstein Freres, Inc., *Ile de France,* Havre, 15 cs.
Max Speigel & Son Co. Inc., *Excambion,* Genoa, 19 bls.

WALL PAPER

——, *Georgic,* London, 3 bls.
——, *Europa,* Bremen, 1 cs.

WALL BOARD

H. G. Craig Co. Inc., *Newscarrier,* Donnacona, 150 crates.

PAPER HANGINGS

W. H. S. Lloyd & Co., *American Merchant,* London, 1 cs. 1 ble.

NEWSPRINT

N. Y. Evening Journal, *Markland,* Liverpool, N. S., 291 rolls.
N. Y. Tribune, *Markland,* Liverpool, N. S., 1430 rolls.
World Telegram, *Markland,* Liverpool, N. S., 579 rolls.
Brooklyn Daily Eagle, *Markland,* Liverpool, N. S., 552 rolls.
Herald Statesman, Inc., *Markland,* Liverpool, N. S., 42 rolls.
N. Y. Post, *Markland,* Liverpool, N. S., 820 rolls.
International Paper Co., *International No. 1,* Gatineau, 373 rolls.
H. G. Craig Co. Inc., *Newscarrier,* Donnacona, 370 rolls.
H. G. Craig Co. Inc., *G. D. D.,* Donnacona, 370 rolls.
Perkins Goodwin & Co., *New York,* Hamburg, 443 rolls.
Jay Madden Corp., *New York,* Hamburg, 369 rolls.

PRINTING PAPER

The Lafayette Co., *American Merchant,* London, 3 cs.

PACKING PAPER

——, *Pennland,* Antwerp, 36 bls.

DRAWING PAPER

Favor Ruhl Co., *Georgic,* London, 3 cs.
H. Reeve Angel & Co. Inc., *Georgic,* London, 2 cs.

FILTER PAPER

H. Reeve Angel & Co. Inc., *Georgic,* London, 9 cs.

FILTER COMPOUND

Mager Bros. Co. Inc., *New York,* Hamburg, 75 bls.

FILTER PULP

——, *New York,* Hamburg, 10 bls.

FILTER MASS

A. Giese & Son, *New York,* Hamburg, 30 bls.

SURFACE COATED BARYTA PAPER

——, *Pennland,* Antwerp, 13 cs.

SURFACE COATED PAPER

Gevaert Co. of America, *Pennland,* Antwerp, 69 cs. (unfinished photo-paper)

PHOTO PAPER

Keuffel & Esser Co., *Scythia,* Liverpool, 1 cs.
Medo Photo-Supply Co., *Georgic,* London, 2 cs.

METAL COVERED PAPER

K. Pauli Co., *New York,* Hamburg, 4 cs.

BASIC PAPER

Dingelstedt & Co., *Europa,* Bremen, 6 cs.

DECALCOMANIAS

Sellers Transportation Co., *Europa,* Bremen, 10 cs.
Phoenix Shipping Co., *Europa,* Bremen, 2 cs.

TISSUE PAPER

F. C. Strype, *American Shipper,* Liverpool, 4 cs.
Meadows Wye & Co., *American Shipper,* Liverpool, 1 cs.
——, *Hokuroku Maru,* Kobe, 22 cs.

TRACING CLOTH

Titan Shipping Co., *Europa,* Bremen, 7 cs.

GUMMED PAPER

Heemsoth Kerner Corp., *Europa,* Bremen, 5 cs.

LETTER PAPER

L. Bamberger & Co., *Ile de France,* Havre, 1 cs.

ENVELOPES

The Lafayette Co., *American Merchant,* London, 1 cs.

PAPER TUBES

——, *New York,* Hamburg, 68 cs.

MISCELLANEOUS PAPER

B. F. Drakenfeld & Co., *American Shipper,* Liverpool, 1 cs.
Globe Shipping Co., *Ile de France,* Harve, 17 cs.
Coty Processing Co., *Ile de France,* Havre, 6 cs.
Pinaud, Inc., *Ile de France,* Havre, 4 cs.
H. Reeve Angel & Co., Inc., *Atutasan Maru,* Yokohama, 5 cs.
Remington Rand, Inc., *Atutasan Maru,* Yokohama, 16 cs.

RAGS, BAGGINGS, ETC.

Manufacturers Trust Co., *Pennland,* Antwerp, 17 bls. rags.
Banco Cml. Italiane Trust Co., *Northern Prince,* Buenos Ayres, 80 bls. rags.
Castle & Overton, Inc., *Excambion,* Alexandria, 265 bls. rags.
Irving Trust Co., *Excambion,* Alexandria, 62 bls. bagging.
E. J. Keller Co. Inc., *Vasaland,* ——, 41 bls. bagging.

HIDE CUTTINGS

——, *American Shipper,* Liverpool, 872 bags.

WOOD PULP

A. Giese & Son, *Maasdam,* Rotterdam, 30 cases.

ALBANY IMPORTS

WEEK ENDING JUNE 25, 1938

Price & Pierce, Ltd., *Bockenheim,* ——, 1800 bls. unbleached sulphate.

BOSTON IMPORTS

WEEK ENDING JUNE 25, 1938

H. W. Noyes & Co. Inc., *Maasdam,* Rotterdam, 100 bls. bagging.

Parsons & Whittemore, Inc., *Aachen,* ——, 353 bls. wood pulp.

PHILADELPHIA IMPORTS

WEEK ENDING JUNE 25, 1938

Max Joseph, *Maasdam,* Rotterdam, 50 bls. filter compound.

United Clay Mines Corp., *Maasdam,* Rotterdam, 50 bags, 500 tons (bulk) china clay.

WILMINGTON IMPORTS

WEEK ENDING JUNE 25, 1938

Price & Pierce, Ltd., *Consul Olsson,* ——, 7800 bls. unbleached sulphite.

BALTIMORE IMPORTS

WEEK ENDING JUNE 25, 1938

Parsons & Whittemore, Inc., *City of Hamburg,* ——, 100 bls. wood pulp.

Gottesman & Co. Inc., *Tisnaren,* Sweden, 5175 bls. unbleached sulphite.

NEWPORT NEWS IMPORTS

WEEK ENDING JUNE 25, 1938

Price & Pierce, Ltd., *Consul Olsson,* ——, 2400 bls. unbleached sulphite.

NEW ORLEANS IMPORTS

WEEK ENDING JUNE 25, 1938

Parsons & Whittemore, Inc., *Konigsberg,* ——, 668 bls. wood pulp.

MONTREAL IMPORTS

WEEK ENDING JUNE 25, 1938

Gottesman & Co. Inc., *Idefjord,* Sweden, 5010 bls. unbleached sulphite.

Gottesman & Co. Inc., *Idefjord,* Sweden, 4800 bls. unbleached sulphate.

Newsprint Investigation Progresses

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., June 29, 1938—Work is progressing satisfactorily on the newsprint paper investigation which is being made by the Federal Trade Commission for the Department of Justice, according to the best information available here. The investigation is covering not only newsprint manufacture and jobbers but it is understood the Commission has requested information from certain publishers.

According to the Commission's officials, it is anticipated that the field work on the survey will be completed early in July and that it will take about a month to write the report for the Department of Justice. It is, therefore, expected that some time between the 1st and 15th of August the report will go to the Justice Department.

It is said that the report will cover the points raised in the resolution, which is not only whether the decree entered into in 1917 against newsprint paper manufacturers is being violated but also whether there are any other violations of the anti-trust laws in the newsprint industry not covered by the decree.

New Container Plant for Evansville

EVANSVILLE, Ind., June 27, 1938—Evansville is to get a new industry, it was learned yesterday with the announcement that the Inland Container Corporation has completed negotiations with Servel, Inc., for the leasing of the former Monitor Furniture Company plant for the installation of a modern corrugated fiber shipping container operation.

Negotiations leading to the bringing of a new industry here were carried out by the industrial committee of the Chamber of Commerce.

The Inland corporation is one of the largest manufacturers of corrugated fibre shipping containers in the United States. It has pioneered in the usage of kraft for shipping containers and its earlier beliefs have been borne out by the tremendous growth and development in the usage of kraft corrugated shipping containers, officials said yesterday. Plants of this company are now located in Milwaukee, Indianapolis and Middleton, Ohio.

Officers of the company are: H. C. Krannert, president; C. A. Behringer, vice president in charge of sales; G. E. Bomberger, vice president in charge of production; V. L. Krannert, secretary.

J. R. Law, formerly of Indianapolis, is to be the resident manager and is now located at the Monitor plant overseeing the alterations necessary to putting the plant in condition for operation at the earliest possible date. LeRoy S. Foster, of Evansville, will be the local sales representative.

Vetoes Pollution Bill

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., June 28, 1938—President Roosevelt this week vetoed the stream pollution bill. This bill, in which the paper industry was so interested, provided for federal cooperation and loans and grants to states, municipalities and industries for abatement of pollution.

In vetoing the bill the President called attention to the fact that specific projects are not subject to review by the Chief Executive. He called attention also to the fact that it provides "for the legislative assumption of responsibility of the executive branch and, therefore, runs counter to the programs of the executive agencies and their presentation to Congress in the form of estimates of appropriation which is a duty imposed upon the Chief Executive and not one for exercise by the legislative branch."

Herb Reinhard Joins Schwarz Paper Co.

CHICAGO, Ill., June 27, 1938—Herb Reinhard, Chicago manager of the Brown Company, Towel Division, has resigned to join the Schwarz Paper Company, Chicago. Mr. Reinhard was with the Brown Company for five years and for the past four years has supervised and managed the Towel Sales Division out of the Chicago office, covering twenty states.

In joining the Schwarz Paper Company, distributors of Brown Company's towels, Mr. Reinhard will have charge of their towel department.

Mr. Reinhard, who is a sales engineer, graduated from the Massachusetts Institute of Technology in 1921, is married, and lives with his family in Evanston.

THE DRAPER FELTS

All kinds and styles of **Felts** for all kinds and styles of Papers.

Write us about your Felt problems and let us help you reduce your Felt Costs—we will call anywhere at any time.

DRAPER BROS. COMPANY

CANTON, MASS.

Woolen manufacturers since 1856

TAPPI STANDARD

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NEW DEAD WEIGHT

TAPPI STANDARD PRECISION MICROMETER 1/10000" ACCURATE

FULLY GUARANTEED

SCHOPPER STANDARD TESTERS

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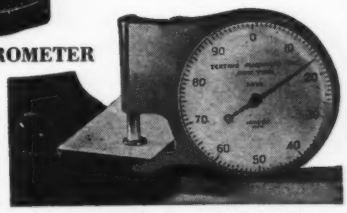
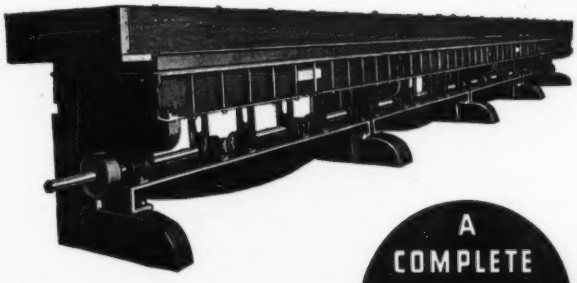


OLD, INACCURATE SCALES, MICROMETERS AND OTHER TESTERS MADE OVER LIKE NEW

TESTING MACHINES, INC.

462 W. 34th St. **New York, N. Y.**



A COMPLETE LINE OF FLAT SCREENS

This New Murray Flat Screen is equipped with a special drive developed to meet exacting and heavy duty requirements with high speed. A modern equipment for the mill that must improve quality and cut operation costs to meet all competition. Quiet in operation. Efficient, these screens will do a better job of cleaning your pulp. No vibration, no pounding, no clatter. Highest efficiency, with lowest maintenance and lowest power costs. This drive can also be installed on your present screens. Write for prices on screens you require to modernize your mill. Remember, we make all sizes and types of construction to fit every requirement.

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WOOD PULP AGENTS

PRICE & PIERCE, Ltd.,

60 EAST 42nd ST.
NEW YORK

New York Market Review

Office of the PAPER TRADE JOURNAL,
Wednesday, June 29, 1938.

With industry and trade entering the summer period when general business activity normally declines, the wholesale paper market reports volume holding up about as well as could be expected under prevailing conditions. Although the opinion has been expressed in some quarters of the trade that some reductions in prices might well be made, the consensus of opinion appears to be that any substantial reduction in prices below current market quotations would do little to stimulate demand at the present time and would have a tendency to increase sales volume at the expense of fair profits. In general, it is believed that prices are now at a fair level and that the relatively low level of demand is entirely due to the lower level of general business activity.

Little change in the distribution of paper and paper products is reported by the wholesale trade for the current week. Production of over two hundred mills is around 65 per cent, compared with 89 per cent for the corresponding week of last year. Distribution is, of course, under that figure but the inventory situation is good and production is fairly well balanced with distribution. Activity in the paper industry is roughly about 25 per cent under that of last year, and the industry is well ahead of other major industries in production and distribution of almost all grades of paper continues high up in the list of consumer goods.

The demand for newsprint continues good and contract shipments are moving in good volume. Prices are relatively firm and unchanged at prevailing quotations.

The kraft paper market continues to show more strength after the late down-and-up movement in prices. Quotations are now back to former levels, with standard wrapping or southern kraft at $4 per cwt. Grocery bag kraft or No. 2 wrapping, continues to be a highly competitive grade and some price cutting is reported, though it normally sells about one-half cent per pound under standard wrapping paper.

Sulphite papers are reported as a little less active for this week and the demand for tissues and writing papers is reported as little changed, with the trade expecting a slight falling off in volume during the summer months.

Lower prices on book and some other grades of white paper has been announced by several large manufacturers this week. The price readjustment of one large manufacturer included all grades of white paper and the reductions ranged from $2 to $9 per ton. The largest reduction was on coated paper and the average reduction on all grades of white paper was about $5 per ton. Another large producer has reduced prices up to $14 per ton on certain grades of book paper.

Chemical Pulp

The demand for chemical pulp continues to be reported as light. No change in prices has occurred in any of the standard grades, though some small lots of domestic pulp of lower grades are reported at well below current market quotations. The increasing uses for pulp in the manufacture of plastics and in paper products of many kinds not properly classified as paper, will doubtless continue to consume larger and larger quantities of pulp of a quality not generally used in the manufacture of paper. If present indications in this respect may be accepted as a guide to the future, the development of new uses for pulp should be sufficient to take a very large part of the tonnage produced by the new mills centered in the South. In the opinion of many well informed men in the pulp trade, the large potential production of the southern mills is not necessarily a threat to overproduction, as other uses than the manufacture of paper are likely to consume large quantities of pulp in the future.

Mechanical Pulp

The demand for mechanical pulp continues light. Quotations on all standard imported and domestic grades are unchanged for this week.

Old Rope and Bagging

Business in the old rope market continues very light. Prices are practically nominal. The demand for old bagging is light and prices continue unchanged at prevailing quotations.

Rags

The demand for domestic rags, new and old, continues light for most grades. White shirt cuttings are reported firm at prevailing quotations. Roofing rags continue firm under a light demand at unchanged prices. The foreign rag market is inactive and prices are nominal.

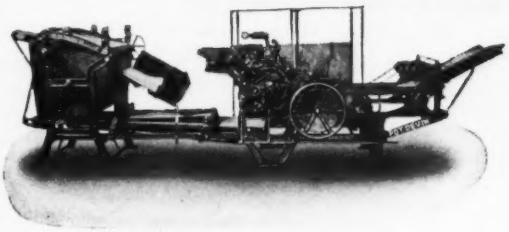
Waste Paper

An extremely light demand is reported in waste paper for the week. White envelope cuttings are in better demand than other grades. Prices of all paper stock are unchanged at prevailing quotations.

Twine

Demand for all grades of soft and hard fiber twines continues relatively light. Prices continue fairly firm and representative market quotations are unchanged for the current week.

POTDEVIN TUBERS & BOTTOMERS



Potdevin Rotary Tube Bottomer

for high-speed production of sift-proof, well-bottomed flour and cement sacks.

TUBERS—Simple, long-range machines handling 1 to 6 webs. POTDEVIN-patented cut-off. May be equipped with printing presses.

BOTTOMERS—Rotary type. Ranges to conform with the tubers. Equipped with automatic throw-offs, counters, corrugators, power-units and pressing units.

TUBE PRINTERS—Multi-color, multi-size; numerous patented improvements.

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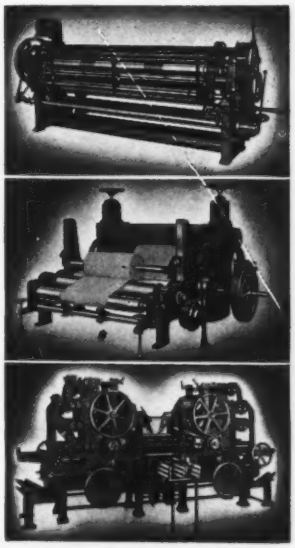

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Manufacturers of paper converting machinery for all purposes.

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STEEL BELT LACING

The smooth, durable hinged joint of Alligator Steel Belt Lacing is the most universally used of all belt lacings. Clinched teeth compress belt ends firmly, reducing destructive internal friction and ply separation. Twelve sizes in steel, "Monel Metal" and alloys for belts up to 5/8 in. Standard boxes, "Handy Packages," and long lengths.

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REG. U. S. PAT. OFFICE

Miscellaneous Markets

Office of the PAPER TRADE JOURNAL,
Wednesday, June 29, 1938.

BLANC FIXE—The demand for blanc fixe continues steady at a moderate level. Prices are unchanged and conform to prevailing quotations. The pulp is quoted at from $42.50 to $45 per ton, in bulk; the powder is offered at from 3½ to 3¾ cents per pound, in barrels, at works.

BLEACHING POWDER—The quotations on bleaching powder are unchanged at prevailing prices. Bleaching powder is quoted at from $2 to $2.25 per 100 pounds, in drums, at works.

CASEIN—The demand for casein is reported as moderate and prices continue firm. Domestic ground casein is quoted at 8 cents per pound; domestic finely ground at 9 cents per pound; all prices in bags, car lot quantities.

CAUSTIC SODA—Quotations on caustic soda continue unchanged at prevailing prices. Solid caustic soda is quoted at from $2.10 to $2.30 per 100 pounds; flake and ground at from $2.50 to $2.70 per 100 pounds, in drums, at works.

CHINA CLAY—The demand for china clay continues at a moderate level. Prices are unchanged at prevailing quotations. Imported clay is quoted at from $14.50 to $25 per ton, ship side. Domestic filler clay is offered at from $6.50 to $12 per ton; coating clay at from $11 to $22 per ton, at mines.

CHLORINE—Quotations on chlorine are unchanged and conform to prevailing prices. Chlorine is quoted at $2.15 per 100 pounds, in single-unit tank cars, f.o.b., works.

ROSIN—The demand for rosin is reported as fair. Prices on several grades are higher for the current week. "G" gum rosin is quoted at $4.47; "FF" wood rosin at $4.30 per 280 pounds, gross weight, in barrels, at Savannah. Seventy per cent gum rosin size is offered at $2.59 per 100 pounds, f.o.b., shipping point.

SALT CAKE—The demand for salt cake is reported at a moderate level. Quotations range at from $12 to $13.50 per ton; chrome salt cake at from $11 to $12 per ton, f.o.b., shipping point. Imported salt cake is quoted at from $14.50 to $15 per ton, Gulf or Atlantic Seaboard, on dock.

SODA ASH—The quotations on soda ash are unchanged and conform to prevailing prices. Prices on soda ash in car lots, at works, per 100 pounds, are as follows: in bulk, $.90; in bags, $1.05; and in barrels, $1.35.

STARCH—The corn starch market is reported as firm. Prices are unchanged for the week. Globe pearl is quoted at $2.60 per 100 pounds, in bags, and at $2.85 in barrels. Special paper starch is quoted at $2.70 per 100 pounds, in bags, and at $2.95 in barrels; all prices in car lots, f.o.b., Chicago.

SULPHATE OF ALUMINA—The prices of sulphate of alumina are unchanged and conform to prevailing quotations. The commercial grades are quoted at $1.15 per 100 pounds; iron free at $1.30 per 100 pounds, in barrels, car lot quantities, f.o.b., works.

SULPHUR—The demand for sulphur is reported as moderate. Prices are unchanged at prevailing quotations. Annual contracts are quoted at $18 per long ton, f.o.b., cars at mines. Spot and nearby car lots are quoted at $21 per ton.

TALC—Quotations on talc are unchanged and conform to prevailing prices. Domestic talc is quoted at from $15 to $18 per ton, Eastern mines. Imported talc is offered at from $25 to $40 per ton, on dock.

Market Quotations

Paper

(Delivered New York)

News, per ton—			
Roll, contract	$50.00	@	—
Sheets	58.00	@	—
Kraft—per cwt.—Delivered Zone A			
No. 1 Northern	$5.25	@	—
Superstandard	4.12½	@	5.00
Northern Standard Wrapping	4.50	@	—
Standard Wrapping	4.00	@	—
Tissues—Per Ream—Carlots			
White No. 1	.92½	@	—
White No. 1 M. G.	.90	@	—
White No. 1½	.67½	@	—
White No. 2	.60	@	—
Anti-Tarnish M. G.	.75	@	—
Colored	.87½	@	—
Kraft	.75	@	—
Manila	.60	@	—
Unbl. Toilet, 1 M.	3.20	@	—
Bleached Toilet	5.26	@	—
Paper Towels—			
Unbleached	1.80	@	—
Bleached	2.10	@	—
Manila—per cwt.—C. l. f. a.			
No. 1 Jute	$8.25	@	$9.75
No. 2 Jute	7.50	@	9.00
No. 1 Wood	4.00	@	5.25
No. 2 Wood	3.50	@	4.00
Boards, per ton—			
News	$27.50	@	$30.00
Chip	27.50	@	30.00
Sgl. Mla. Ll. Chip	42.50	@	45.00
Jute Lined Chip	45.00	@	—
White Pat. Coated	55.00	@	57.50
Kraft Liners	52.50	@	—
Binders Boards	71.00	@	77.00

The following are representative of distributors' resale prices:—

Rag Content Bonds and Ledgers—White, Assorted Items, Delivered in Zone 1:

	Bonds	Ledgers
100% Rag Ext. No. 1.	$39.10@$46.00	$40.25@$47.25
100% Rag	31.05@ 36.50	32.20@ 37.75
85% Rag	.....	29.90@ 35.00
75% Rag	23.60@ 27.75	24.75@ 29.00
65% Rag	.....	21.65@ 26.25
50% Rag	17.55@ 21.50	18.70@ 22.75
25% Rag	14.65@ 17.75	15.80@ 19.25

Colors at $1.00 cwt. extra

Sulphite Bonds and Ledgers—White, Assorted Items, Delivered in Zone 1:

	Bonds	Ledgers
No. 1	$8.80@$10.75	$9.95@$12.00
No. 2	7.90@ 9.50	9.05@ 11.00
No. 4	7.00@ 8.50	8.20@ 10.00

Colors $1.00 cwt. extra.

Free Sheet Book Papers—White, Cased Paper, Delivered in Zone 1:

No. 1 Glossy Coated	$12.15@$14.25
No. 2 Glossy Coated	10.55@ 12.25
No. 3 Glossy Coated	9.35@ 11.00
No. 4 Glossy Coated	8.80@ 10.50
No. 1 Antique (watermarked)	8.80@ 10.50
No. 2 Offset	8.05@ 9.50
A Grade E. F.	7.90@ 9.50
A Grade S. & S. C.	8.15@ 9.75
B Grade E. F.	7.30@ 8.75
B Grade S. & S. C.	7.55@ 9.00
C Grade E. F.	7.00@ 8.50
C Grade S. & S. C.	7.25@ 8.75
D Grade E. F.	6.75@ 8.25
D Grade S. & S. C.	7.00@ 8.50

Ivory & India at $.50 cwt. extra.

Mechanical Pulp

(On Dock, Atlantic Ports)

No. 1 Imported—			
Moist	27.00	@	30.00
Dry	27.00	@	30.00
(Delivered)			
No. 1 Domestic and Canadian	29.00	@	33.00

Chemical Pulp

(On Dock, Atlantic, Gulf and West Coast Ports)

Bleached Sulphite (Domestic and Foreign)—			
Prime Bleached Sulphite	2.50	@	3.00
Prime Qualities—			
Easy-Bleaching Sulphite	2.25	@	2.50
Strong Unbleached Sulphite	2.00	@	2.25
(On Dock, Atlantic Ports)			
Kraft Bleached	2.75	@	3.00
Kraft Light & Strong	2.00	@	2.25
Kraft No. 1	1.85	@	2.15
Kraft No. 2	1.75	@	1.90
(F.o.b. Pulp Mill)			
Kraft Domestic	1.75	@	2.25
(Delivered)			
Soda Bleached	2.70	@	—

Add 60 cents per short ton, dest charges for Albany; $2.50 for Lake Ports East and $3.50 for Lake Ports West of Mackinac Straits.

Domestic Rags

New Rags

(Prices to Mill f. o. b. N. Y.)

Shirt Cuttings—			
New White, No. 1.	6.00	@	6.25
Silesias No. 1	5.00	@	5.25
New Unbleached	6.25	@	6.50
Blue Overall	4.00	@	4.50
Fancy	2.25	@	2.50
Washables	1.80	@	1.90
Mixed Khaki Cuttings	3.60	@	3.75
O. D. Khaki Cuttings	4.35	@	4.50

Old Rags

White, No. 1—			
Repacked	3.40	@	3.50
Miscellaneous	2.75	@	3.00
White, No. 2—			
Repacked	2.10	@	2.25
Miscellaneous	1.70	@	1.80
Thirds and Blues—			
Repacked	1.40	@	1.50
Miscellaneous	1.25	@	1.30
Roofing Rags—			
No. 1	1.00	@	1.15
No. 2	.75	@	.80
No. 3 (bagging)	.65	@	.70
No. 4	.65	@	.70
No. 5A	.65	@	.70

Foreign Rags

New Rags

New Dark Cuttings	2.25	@	2.40
New Mixed Cuttings	2.00	@	2.20
New Light Silesias	5.50	@	5.75
Light Flannelettes	5.50	@	5.75
New White Cuttings	7.00	@	7.50
New Light Oxford	4.00	@	4.50
New Light Prints	3.00	@	3.25

Old Rags

No. 1 White Linens	7.50	@	8.50
No. 2 White Linens	6.50	@	7.50
No. 3 White Linens	4.50	@	—

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EASTON PAPER MAKERS IMPORTING CO. INC. EASTON, PENNSYLVANIA, U.S.A.

COATING **FILLING**

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TALC
UMBERS
VENETIAN REDS
YELLOW OCHRES

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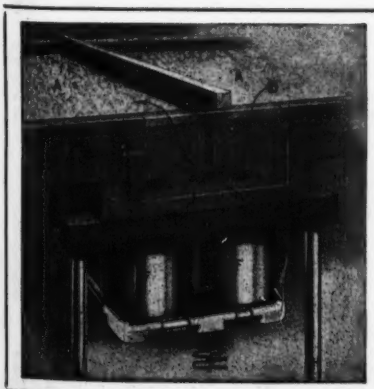

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Electrical Specialists Holyoke, Mass. *Established 1885*

No. 4 White Linens.	2.25	@	3.25
No. 1 White Cotton.	4.25	@	4.75
No. 2 White Cotton.	3.25	@	3.75
No. 3 White Cotton.	2.50	@	3.00
No. 4 White Cotton.	1.90	@	2.20
Extra Light Prints..	2.00	@	2.40
Ord. Light Prints...	1.75	@	2.15
Med. Light Prints...	1.55	@	1.95
Dutch Blue Cottons..	2.25	@	2.50
French Blue Linens..	3.00	@	—
Checks and Blues...	2.00	@	—
Linsey Garments....	1.90	@	2.00
Dark Cottons.....	1.50	@	1.60
Old Shopperies.....	1.30	@	1.45
New Shopperies.....	1.45	@	1.50
French Blues.....	2.25	@	2.50

Old Rope and Bagging

Prices to Mill f. o. b. N. Y.)

Gunny No. 1—			
Foreign	2.35	@	2.50
Domestic	2.50	@	2.75
Wool Tares, light....	1.50	@	1.75
Wool Tares, heavy..	2.00	@	2.10
Bright Bagging.....	1.60	@	1.70
Manila Rope—			
Foreign	2.50	@	2.75
Domestic	2.75	@	2.90
Jute Threads.....	2.75	@	3.00
Sisal Strings.....	1.75	@	2.00
Mixed Strings.....	.60	@	.70

Old Waste Papers

(F. o. b. New York)

Shavings—			
White Envelope Cuttings	2.35	@	2.50
Ordinary Hard White No. 1....	1.90	@	2.00
Soft White No. 1..	1.80	@	2.20
Flat Stock—			
Stitchless	.70	@	.80
Overissue Mag.....	.60	@	.70
Solid Flat Book...	.55	@	.60
Crumbled No. 1...	.40	@	.45
Ledger Stock.....	.90	@	.95
New B. B. Chips....	.15	@	.20
Manila—			
New Env. Cut....	1.85	@	2.00
New Cuttings.....	1.50	@	1.60
Old Kraft Machine—			
Compressed bales..	.60	@	.70
News—			
No. 1 White News	1.25	@	1.30
Strictly Overissue.	.45	@	.50
Strictly Folded....	.20	@	.25
No. 1 Mixed Paper..	.05	@	.10

Twines

(F. o. b. Mill)

(Soft Fiber)

Coarse Polished—			
India	.11	@	.13
White Hemp.....	.12	@	.14
Fine Polished—			
Fine India.....	.15	@	.17
Unpolished—			
Box	.08½	@	—
Paper Makers.....	.07½	@	.08½
Tube Rope.....	.09	@	.10
Wall Paper.....	.10	@	.11
Wrapping	.11	@	.13
Soft Fiber Rope...	.09½	@	.11½
Cotton	.15	@	.20

(Hard Fiber)

Medium Java.....	.09	@	.10
Mex. Sisal.....	.08½	@	.09½
Manila	.18	@	.25
Domestic	2.25	@	2.50
Sisal Rope.....	1.65	@	1.85
Mixed Rope.....	.50	@	.75
Transmission Rope...	1.60	@	1.85
Soft Jute Ropes.....	1.75	@	1.90
Jute Carpet Threads.	.90	@	1.25
Gunny Bagging—			
Foreign	2.30	@	2.35
Domestic	1.85	@	1.95
Bleachery Burlap....	3.25	@	3.75
Scrap Burlap—			
Foreign	1.50	@	1.60
Domestic	1.25	@	1.50
Scrap Sisal	1.25	@	1.50
Scrap Sisal for Shredding	1.75	@	1.90
Wool Tares, Heavy..	1.50	@	1.60
New Burlap Cuttings	1.75	@	2.00
Aust. Wool Pouches.	2.75	@	3.00
Heavy baling bagging	1.85	@	2.00
Paper Mill Bagging..	1.00	@	1.15
No. 2 Bagging.....	.60	@	.70

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints.	.03	@	.03¼
New White No. 1...	.06½	@	.06¾
New White No. 2.	.05	@	.05½
New Light Flannelettes	.04¼	@	.04¾
Silesias No. 1.....	.04¼	@	.04¾
New Black Silesias..	.03¾	@	.04
Silesias No. 1			
Soft Unbleached.....	.06½	@	.06¾
Blue Cheviots.....	.05	@	.05¼
Fancy	.03	@	.03¾
Washable	.02¾	@	.03
Cottons—According to grades—			
Blue Overalls.....	.04¾	@	.05
New Black, soft...	.03¾	@	.04
Khaki Cuttings....	.03¼	@	.03¾
O. D. Khaki.....	.04	@	.04½
Corduroy	.02¾	@	.03
New Canvas.....	.06¾	@	.07¼
B.V.D. Cuttings.....	—	@	.06½

Domestic Rags (Old)

(F. o. b. Boston)

Canvas	.04½	@	—
White No. 1—			
Repacked	—	@	2.75
Miscellaneous	2.50	@	2.75
White No. 2—			
Repacked	1.90	@	2.00
Miscellaneous	2.00	@	2.25
Twos and Blues.....	1.75	@	2.00
Third and Blues—			
Repacked	1.37½	@	1.75
Miscellaneous	1.25	@	1.62¼
Black Stockings.....	3.90	@	4.00
Roofing Stock—			
No. 1.....	1.00	@	1.10
No. 2.....	.75	@	.85
No. 3.....	.65	@	.70

Foreign Rags

(F. o. b. Boston)

Dark Cottons.....	1.00	@	1.05
Dutch Blues.....	2.65	@	2.75
New Checks and Blues	2.85	@	3.00
Old Fustians.....	2.25	@	2.50
Old Linsey garments.	1.75	@	1.90
New Silesias.....	6.00	@	6.30

PHILADELPHIA

Domestic Rags (New)

Price to Mill, f. o. b. Phila.)

Shirt Cuttings—			
New White, No. 1.	.05½	@	.06
New White, No. 2.	.03½	@	.04
Light Silesias.....	.04	@	.04½
Silesias, No. 1....	—	@	.04½
Black Silesias, soft.	.03	@	.03¾
New Unbleached..	—	@	.06
Washable, No. 1..	.01¾	@	.01½
Blue Overall.....	.04	@	.04½
Cottons—According to grades—			
Washable No. 2...	.01	@	.01¼
New Blue.....	.01	@	.01¼
Fancy Percales....	—	@	.02½
New Black Soft...	.03	@	.03½
New Light Seconds	—	@	.04½
New Dark Seconds	.50	@	.75
Khaki Cuttings—			
No. 1 O. D.....	.03½	@	.04
No. 2 Mixed.....	.02	@	.02½
Corduroy	—	@	.02
New Canvas.....	.05	@	.05½
New Black Mixed.	.02½	@	.02¾

Domestic Rags (Old)

White No. 1—			
Repacked	3.50	@	4.00
Miscellaneous	2.00	@	2.25
Twos and Blues—			
Miscellaneous	1.00	@	1.25
Repacked	1.50	@	1.75
Black Stockings (Export)	3.00	@	3.50
Roofing Stock—			
Foreign No. 1....	—	@	.75
Domestic No. 1...	—	@	1.00
Domestic No. 2...	—	@	.85
Roofing Bagging..	—	@	.70

Bagging

(F. o. b. Phila.)

Gunny, No. 1—			
Foreign	1.50	@	1.75
Domestic	1.50	@	1.75
Manila Rope.....	3.00	@	3.25
Sisal Rope.....	—	@	1.50
Mixed Rope.....	.75	@	1.00
Scrap—			
No. 1.....	—	@	1.50
No. 2.....	1.00	@	1.25
Wool Tares, heavy..	3.25	@	3.50
Mixed Strings.....	1.00	@	1.10
No. 1 New Light Burlap	3.00	@	3.50
New Burlap Cuttings	1.75	@	2.00

Old Papers

(F. o. b. Phila.)

Shavings—			
No. 1 Hard White.	2.15	@	2.20
No. 2 Hard White.	2.00	@	2.10
No. 1 Soft White..	1.80	@	1.90
No. 2 Soft White..	1.25	@	1.30
No. 1 Mixed.....	.70	@	.75
Solid Ledger Stock..	1.50	@	1.60
Ledger Stock, white.	1.00	@	1.50
Ledger Stock, colored	.75	@	.80
No. 1 Books, heavy..	.65	@	.70
Manila Cuttings.....	1.50	@	1.75
Print Manila.....	.30	@	.35
Container Manila....	—	@	.40
Kraft Paper.....	.75	@	.80
No. 1 Mixed Paper..	.15	@	.20
Straw Board Chip...	.25	@	.30
Binders Board Chip.	.25	@	.30
Corrugated Board...	.50	@	.55
Overissue News.....	.50	@	.55
Old Newspapers.....	.25	@	.30

BOSTON

Old Papers

(F. o. b. Boston)

Shavings—			
No. 1 Hard White.	2.25	@	2.40
No. 1 Soft White..	1.85	@	2.15
No. 2 Mixed.....	.75	@	.80
Solid Ledger Books..	1.50	@	1.75
Overissue Ledger Stock	1.30	@	1.50
Mixed Ledgers.....	.85	@	.90
No. 1 Books, heavy..	.65	@	.75
No. 1 Books, light...	.65	@	.75
Crumpled Stitchless Book Stock.....	.55	@	.65
Manila Env. Cuttings	1.60	@	1.70
Manila Envelope Cuttings, extra quality	2.10	@	2.20
No. 1 Old Manila...	.95	@	1.00
White Blank News..	1.30	@	1.40
No. 1 Kraft.....	.90	@	—
Mixed Papers.....	—	@	.10
Print Manila.....	.45	@	.50
Container Manilas...	.27½	@	—
Old Newspapers.....	.25	@	.32½
Paper Wool Strings..	.75	@	—
Overissue News.....	.45	@	.50
Box Board Chips....	.20	@	.25
Corrugated Boxes....	.27½	@	.30
Kraft corrugated boxes	.65	@	.70
Screening Wrappers..	.40	@	.45

Bagging

(F. o. b. Boston)

Manila Rope—			
Foreign	2.40	@	2.50

CHICAGO

Old Papers

(F. o. b. Chicago)

Shavings—			
No. 1 White Envelope Cuttings....	1.80	@	1.90
No. 1 Hard White.	1.70	@	1.80
No. 1 Soft White..	1.50	@	—
Ledger & Writings..	.75	@	.80
Solid Books.....	.55	@	—
Blanks	.90	@	—
Krafts	.60	@	—
New Kraft Cuts.....	1.10	@	—
Manila Env. Cuts...	Nominal		
Ex. No. 1 Manila...	Nominal		
Print Manila.....	Nominal		
Overissue News.....	.35	@	—
Old Newspapers—			
No. 1 Folded News	.30	@	—
No. 1 Mixed Paper	.20	@	—
Roofing Stocks—			
No. 1.....	2.00	@	2.25
No. 2.....	1.85	@	2.00

TORONTO

Paper

Bonds and Ledgers

Delivered

No. 1 White	.36½	@	—
No. 1 Tints	.37½	@	—
No. 2 White	.26½	@	—
No. 2 Tints	.27½	@	—
No. 4 White	—	@	.1550
No. 4 Tints 16.50		@	—
No. 5 Bond—White 11.85		@	—
No. 5 Bond—Tints .12.85		@	—
No. 5 Bond—Golden Rod 13.35		@	—
No. 5 Ledger—White .1185		@	—
No. 5 Ledger—Tints. .1285		@	—
No. 6 Bond—White .10.75		@	—
No. 6 Bond—Tints .11.25		@	—
No. 6 Bond—Golden Rod 12.75		@	—
No. 7 Bond—White . 9.10		@	—
No. 7 Bond—Tints . 9.60		@	—
No. 7 Bond—Golden Rod 11.10		@	—
Book—			
No. 1 M. F. 7.35		@	—
No. 2 M. F. 6.85		@	—
No. 3 M. F. 5.60		@	—
No. 1 S. C. 7.60		@	—
No. 2 S. C. 7.10		@	—
No. 3 S. C. 6.10		@	6.35
No. 1 Coated Book and Litho 12.50		@	—
No. 2 Coated Book and Litho 11.00		@	—
No. 3 Coated Book and Litho 10.00		@	—
Coated tinted.....13.50		@	—
Wrapping—delivered—			
Rag Brown.....	4.85	@	5.55
White Wrap.....	4.00	@	—
"B" Manila.....	4.90	@	6.25
No. 1 Manila.....	5.50	@	7.00
Fiber	5.50	@	—
Kraft No. 2	[illegible]		

(F. o. b. Cars, Toronto)

News per ton—			
Rolls (contract)..$50.00		@	—
Sheets 69.50		@	—

Pulp

Ground wood.....29.50		@	—
Unbleached Sulphite.54.00		@	—
Book (Class 1).....64.00		@	—
Writing (Class 2)...62.00		@	—
Select (Class 3).....63.00		@	—
Kraft 50.00		@	—
Soda 56.00		@	—

Old Waste Paper

(In carload lots, f. o. b. Toronto)

Shavings—			
White Env. Cut...	2.25	@	—
Soft White.....	2.15	@	—
White Blk. News..	1.25	@	—
Book and Ledger—			
Flat Magazine and Book Stock (old)	.80	@	—
Light and Crumpled Book Stock.	.75	@	—
Ledgers and Writings	1.10	@	—
Manilas—			
New Manila Cut...	1.35	@	—
Printed Manilas...	.45	@	—
Kraft	.95	@	—
News and Scrap—			
Strictly Overissue.	.50	@	—
Strictly Folded....	.45	@	—
No. 1 Mixed Paper..	.30	@	—

Domestic Rags

(Price to mills, f. o. b. Toronto)

No. 1 White Shirt Cuttings	.06½	@	.06¾
Fancy Shirt Cuttings	.02¼	@	.02½

REDWOOD PIPE LASTS LONG AND SAVES MONEY

It has 14% greater carrying capacity than metal pipe. Resists Frost where severe winters raise havoc with metal pipe. Does not fill up with vegetable matter nor corrode; does not Scale or Pit; is immune to Electrolysis; weighs about 1/3 as much as metal pipe and more easily installed. Wyckoff Redwood Pipe, made of all Clear Heart Stock Redwood Lumber, made in sizes of one inch and up, maximum lengths 12 feet, for pressure to 172 pounds, is used extensively for Water Supply Lines, Penstocks, Sewage Lines, Chemicals, Paper Mills, Tanneries, Fisheries, Mines, and Fume Stacks. We can furnish selected Canadian White Pine or Oregon Fir Wood Pipe if specified. We also manufacture underground Wooden Steam Pipe Covering. Carload shipments can be made one day after receipt order.

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The Originators of Machine Made Wood Pipe

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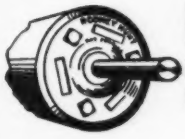
It's Time To Modernize!

Tell us your needs and we'll send complete information and blue prints of Kalamazoo Vitrified Glazed Tile for Jordan Chests, beater storage chests, beater dump chests, Fletcher-Bleachers, and stock chests. Also Wood Tanks, Acid Tanks, and Blow Pits.

KALAMAZOO TANK & SILO COMPANY

KALAMAZOO, MICHIGAN



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is being written in paper mills by Rodney Hunt's

"SHAF-TITES"

Patented head construction that prevents loose shafts. Low cost. End roll troubles by writing today.

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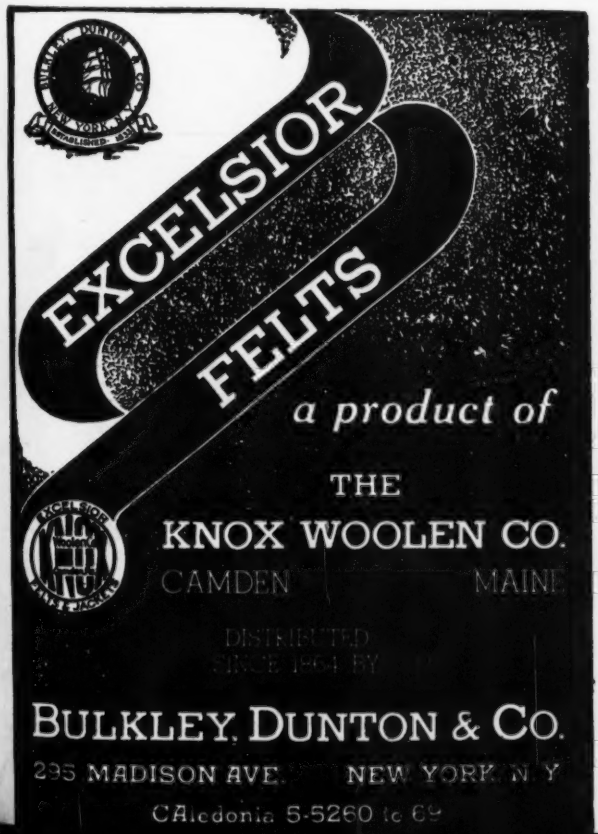

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Oil and water resistant belts that will save you money in the long run. ¶ Since 1876 we have been supplying the industry direct from our own tanneries.

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Valuations	Steam Power Plants
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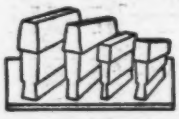
WOOD COGS
OF ALL DESCRIPTIONS, BLANK OR FINISHED
From Thoroughly Seasoned New Hampshire Rock Maple



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Perforated Screens
For Pulp and Paper Mills

Steel, Copper, Brass
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Punched for Centrifugal
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giving maximum suspension and dispersion in water, assuring high efficiency and value.

The opacity and brightness of ZOPAQUE will produce an exceptional paper for you. . . . .

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BLEACHED SULPHITE AND SODA PULP
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"SITUATIONS WANTED" ADVERTISEMENTS—4c a word. double rates for heavy face type. Minimum charge $1.00. If repeated ½ rate will be charged for each consecutive repetition.

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All classified "Help Wanted" and "Situation Wanted" advertisements are payable in advance.

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TECHNICAL CONTROL

An opportunity for a man between 28 and 35 years of age in a large, progressive and rapidly expanding eastern paper mill as Assistant to head of the department.

The man we select must have outstanding ability to work closely and harmoniously with the Operating Department, a scientific education with a college degree, alertness to his technical responsibilities, previous experience in paper manufacture, and ability to develop in his field of activity.

Applications will be received until July 16 and must include full details of education, experience, salary requirements and personnel qualifications. A recent photograph must accompany the application.

Address Box 38-235, care Paper Trade Journal. J-30

SALARIED POSITIONS. $2,500 to $25,000. This thoroughly organized advertising service of 28 years' recognized standing and reputation carries on preliminary negotiations for positions of the calibre indicated, through a procedure individualized to each client's personal requirements. Several weeks are required to negotiate and each individual must finance the moderate cost of his own campaign. Retaining fee protected by a refund provision as stipulated in our agreement. Identity is covered and, if employed, present position protected. If you have actually earned over $2,500, send only name and address for details. R. W. Bixby, Inc., 117 Delward Bldg., Buffalo, N. Y.

WANTED—ADJUSTER on Square and Flat Potdevin and Lockport Machines. Man that can take charge of small plant in Greater New York. Address Box 38-240, care Paper Trade Journal. J-30

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COLORMAN AND BEATERROOM FOREMAN wishes position. Familiar with Kraft, Sulphite and Specialty papers. Address Box 38-159, care Paper Trade Journal. J-7

COATING MAN—Executive type—young man technical graduate, Assistant Superintendent, Color Foreman, etc. Tag, friction, book, covers, box papers. Desires new position. Address Box 38-245, care Paper Trade Journal. J-28

TECHNICAL DIRECTOR OR MANAGER—University graduate with high grade technical training and many years successful experience with large eastern pulp, paper, board, color and specialty mills. Exceptional record and proven ability technical control, operation, development, service, consultation, publications. Member TAPPI, C.P.P.A., F.A.I.C. Seek opportunity with reliable and progressive organization. Address Box 38-342, care Paper Trade Journal. J-7

CHEMICAL ENGINEER—Fifteen years' experience in pulp and paper, viscose rayon manufacture, process and equipment development, by-product recovery, desires responsible position. Address Box 38-244, care Paper Trade Journal. J-14

SITUATIONS WANTED

PAPER MAKER desires position as beater room foreman, assistant superintendent or tour boss. Color expert. Kraft, sulphite, light and heavy weight papers. Address Box 38-160, care Paper Trade Journal. J-7

AVAILABLE—Skilled Erector and Dismantler, broad experience installing, dismantling and operating paper making machinery. References. Address Box 38-237, care Paper Trade Journal. J-7

ROTARY PRESS—Foreman on all classes of printing. Twenty years' experience on fine color work including Wax and Glassine. Address Box 38-234, care Paper Trade Journal. J-7

CHEMIST—College graduate. Age 25. Practical experience in tissue mill. TAPPI Member. Desires to make new connection with the Pulp and Paper Industry in Canada or U.S.A. Address Box 38-232, care Paper Trade Journal. J-30

MACHINE TENDER wishes position running a folding and setting box board machine. Address Box 38-226, care Paper Trade Journal. J-30

PAPER MAKER desires position. Experience operating, maintenance and installation. Capable of handling men and assuming full responsibility. Address Box 38-231, care Paper Trade Journal. J-30

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GRADUATE IN PULP AND PAPER—Thirty one, employed, considerable experience, desires any kind of work with future. Prefer Laboratory, Research. TAPPI Member. Address Box 38-233, care Paper Trade Journal. J-30

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PAPER COATING MACHINERY — Waxing, Oiling, Gumming, Gluing, Asphalt Duplexing Laboratory Coating and Treating machines. High speed. New improvement. MAYER COATING MACHINES COMPANY, INC., Rochester, N. Y. T.F.

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Harper Fourdrinier Machine, trims 72". Two presses. 19 dryers 36 x 76". Two calenders. Reel. Winder. Drive.
Experimental Fourdrinier Machine 48" wire.
Moore & White Fourdrinier part, suspension type takes a wire 80" x 50', with suction couch roll
Dryers: 40—36" x 84".
Ream Cutters: 3 Seybolds 50" to 54".
Hamblet Cutters: 48" to 90" single; 94" to 108" 36" duplex.
Approximately 1,000 calender and press rolls.
FRANK H. DAVIS COMPANY
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FOR SALE—Beloit Creping Machine, 74" wide, suitable for creping rolls 68" wide. Three driers and necessary counter shafts. Equipment practically new. Daniels Manufacturing Co., Rhinelander, Wisc. tf

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WE BUY WE SELL
REEVES DRIVES
No. 000 to No. 8—All types
SPEED REDUCERS
All Ratios Up to 200 Horsepower
ALL DRIVES OVERHAULED
Money Back Guarantee
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FOR SALE—40" Oswego Auto Cutter, rebuilt and fully guaranteed. Address Box 38-248, care Paper Trade Journal. J-30

WANTED

WANTED—One 55" Face Board Calender 2 rolls with steam jets. Should be at least 16" diam. Address Box 38-162, care Paper Trade Journal. tf

WANTED—¼" plug and shell fillings for small Horne Jordan. Address Box 38-211, care Paper Trade Journal. J-7

WANTED—One #3 Nash Suction Pump or its equivalent. Address Box 38-227, care Paper Trade Journal. tf

WANTED—Experimental laboratory beater of five or ten pound capacity. Standard make preferred. Must be in good condition. Address Box 38-243, care Paper Trade Journal. J-30

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for all equipment exposed to corrosion by sulphite acids

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PAPER MAKERS ROSIN SIZE

Manufactured from

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Paper Makers Chem. Corp.
Pennsylvania Salt Mfg. Co.

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Hardy, George F.
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Cash Company, A. W.
The Foxboro Company
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The Foxboro Company

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Weber, Herman G.

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Midwest-Fulton Machine Co.
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Emerson Manufacturing Co.
E. D. Jones & Sons Co.
Midwest-Fulton Machine Co.
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Valley Iron Wks.

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BLOW PITS
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Moore & White Co.
Norwood Engrg. Co.
Perkins & Son, Inc., B. F.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works
Waldron Corp., John

CALENDER ROLLS
Appleton Machine Co.
Beloit Iron Wks.
Black-Clawson Company
Farrel-Birmingham Co.
Lobdell Car Wheel Co.
Norwood Engineering Co.
Perkins & Son, Inc., B. F.
Shartle Brothers Machine Co
Waldron Corp., John

CALIPERS (Micrometer)
Farrel-Birmingham Co.
Lobdell Car Wheel Co.

CAM TOE BLOCKS
Continental Diamond Fibre Co

CAMERAS (Photomicrographic)
Bausch Lomb Optical Co

CARBON TETRACHLORIDE
American Cyanamid & Chemical Corp.
Diamond Alkali Company
Grasselli Chemical Dept. of Du Pont de Nemours & Co.
Pennsylvania Salt Mfg. Co.

CASEIN
Amer. Cyanamid & Chem. Corp
Casein Co of America
Paper Makers Chemical Corp

CASTINGS
Midwest-Fulton Machine Co.

CASTINGS
Appleton Machine Co.
Babcock & Wilcox Co.
Beloit Iron Works
Black-Clawson Company
The Cooper Alloy Foundry Co
Downingtown Mfg. Co.
Duriron Company
Farrel-Birmingham Co.
The Frederick Iron & Steel Co.
Hamblet Machine Co.
International Nickel Co.
E. D. Jones & Sons Co.
Link Belt Co.
Lobdell Car Wheel Co.
Michigan Steel Casting Co.
Midwest-Fulton Machine Co.
Montague Machine Co.
Shartle Brothers Machine Co
Smith & Winchester Mfg. Co

CAUSTIC SODA
American Cyanamid & Chemical Corp.
Columbia Alkali Corp.
Diamond Alkali Company
Electro Bleaching Corp.
Grasselli Chemical Dept. of Du Pont de Nemours & Co.
Paper Makers Chemical Corp
Pennsylvania Salt Mfg. Co.
Solvay Sales Corp.

CEMENT (Acid Proof)
Pennsylvania Salt Mfg. Co
Stebbins Engrg. & Mfg. Co.

CENTRIFUGAL MACHINERY
Bird Machine Co.
De Laval Steam Turbine Co.
Shartle Brothers Machine Co.
Singer, J. E.

CHAIN DRIVES
Link-Belt Co.

CHEMICAL ENGINEERS
J. B. Calva & Co.
Chemical Construction Corp

CHEMICAL FEED EQUIPMENT
Leeds & Northrup Company
Wallace & Tiernan Co., Inc.

CHEMICALS
Amer. Cyanamid & Chem. Corp
Chemical & Pigment Co
Diamond Alkali Company
E. I. du Pont de Nemours & Co., Inc.
Electro Bleaching Gas Co.
General Dyestuff Corp.
Geigy Co., Inc.
N. Y. Color & Chemical Co.
Paper Makers Chemical Division of Hercules Powder Co.
Pennsylvania Salt Mfg. Co.
Solvay Sales Corp.
Williams & Co., C. K.

WHERE TO BUY

CHIPPERS
Allis Chalmers Mfg. Co.
Appleton Machine Co.
D. J. Murray Mfg. Co.
Valley Iron Works Co.

CHLORINATING APPARATUS
Stebbins Engrg. & Mfg. Co.

CHLORINE
American Cyanamid & Chemical Corp.
Columbia Alkali Corp.
Diamond Alkali Company
Electro Bleaching Gas Co.
Pennsylvania Salt Mfg. Co.
Solvay Sales Corp.

CHLORINE CONTROL APPARATUS
Wallace & Tiernan Co., Inc.

CHROME PLATE
Chromium Corp. of America

CHUCKS
John Waldron Corp.

CLAY
Amer. Cyanamid & Chem. Corp.
English China Clays Sales Corp.
International Pulp Co.
Paper Makers Importing Co.
Vanderbilt Co., R. T.

CLEANING MATERIALS
American Cyanamid & Chemical Corp.
Bird Machine Co.
Magnus Chemical Co.
Pennsylvania Salt Mfg. Co.
Philadelphia Quartz Co.
Solvay Sales Corp.

CLUTCHES
Allis Chalmers Mfg. Co.
Appleton Machine Co.
Bagley & Sewall Mfg. Co.
Beloit Iron Works
Black-Clawson Company
Farrel-Birmingham Co.
Link-Belt Co.
Rodney Hunt Machine Co.
Moore & White Co.
D. J. Murray Mfg. Co.
T. B. Wood's Sons

CO 2 RECORDERS
The Foxboro Company
Leeds & Northrup Company

COAL & ASH HANDLING MACHINERY
Link Belt Co.

COATING MACHINERY
Cameron Machine Co.
Eppenbach, Inc.
Moore & White Co.
Potdevin Machine Co
Shartle Brothers Machine Co.
Strachan & Henshaw Ltd.
Waldron Corporation, John
Weber, Herman G.

COATING MATERIALS
American Cyanamid & Chemical Corp.
Paper Makers Chemical Corp.
Stebbins Engrg. & Mfg. Co.

COCKS, Lubricated
Crane Co.
Duriron Company
Walworth Co.

COGS
Bowsher, N. P., The

COLLOID MILLS
Eppenbach, Inc.

COLORIMETERS
Bausch & Lomb Optical Co.
Testing Machines, Inc.

COLOR ANALYZERS
General Electric Co.
Testing Machines, Inc.

COLOR MIXING EQUIPMENT
Midwest-Fulton Machine Co.
Shartle Brothers Machine Co.,
Waldron, John, Corp.

COMBINING MACHINE
Shartle Brothers Machine Co.
Waldron, John, Corp.

COMBUSTION CONTROL SYSTEMS
Cash Company, A. W.
Leeds & Northrup Company

COMPRESSORS
Allis-Chalmers Mfg. Co.
Delaval Steam Turbine Co.
Nash Engineering Co.
Oliver United Filters, Inc.
Worthington Pump & Mchy.

CONDENSATE SCOOPS
Foster Wheeler Corporation
Midwest-Fulton Machine Co.

CONDENSER TUBES
Babcock & Wilcox Co.
Chase Brass & Copper Co.
H. M. Hillman

CONDUCTIVITY RECORDERS
Leeds & Northrup Company

CONSULTING ENGINEERS
J. E. Sirrine & Company

CONSULTING & RESEARCH
J. B. Calva & Co.

CONTRACTORS
Merritt-Chapman & Scott Corp.

CONTROLLERS, Moisture Content
The Foxboro Company

CONTROLLING INSTRUMENTS
Bristol Co., The
The Brown Instrument Co.
Cash Company, A. W.
The Foxboro Company
General Electric Co.
Leeds & Northrup Company
Testing Machines, Inc.

CONVEYOR BELTS
The Cincinnati Rubber Mfg.
Link Belt Co.
U. S. Rubber Products, Inc.

CONVEYORS (Broke)
Black-Clawson Company

CONVEYOR CHAINS
Link-Belt Co.

CONVEYORS
Link-Belt Co.
Murray, D. J. Mfg. Co.
Ross Engineering Corp., J. O.

COOKING APPARATUS
E. D. Jones & Sons Co.

COOKING AND RECOVERY PROCESS
Chemical Construction Corp.
Chemipulp Process, Inc.
Foster Wheeler Corporation
Murray Mfg. Co., D. J.
Ross Engineering Corp., J. O.

COOLERS
Foster Wheeler Corporation
Ross, J. O. Mfg. Co.
Stebbins Engrg. & Mfg. Co.
Worthington Pump & Mchy. Corp.

COPPER TUBES
H. M. Hillman

COPPER WATER TUBE AND SWEAT FITTINGS
Chase Brass & Copper Co.

CORES (Paper)
Elixman Paper Co.
Sonoco Products Co.

CORES (Steel)
Rodney Hunt Machine Co.
Smith & Winchester Mfg. Co.

COUCH ROLLS
American Wringer Co.
Appleton Machine Co.
Beloit Iron Works
Black-Clawson Company
The Cincinnati Rubber Mfg. Co.
Downingtown Mfg. Co.
Emerson Mfg. Co.
Goodrich Rubber Co., B. F.
Moore & White Co., The
The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc.
Rodney Hunt Machine Co
Shartle Brothers Machine Co.
Montague Machine Co.
D. J. Murray Mfg. Co.
Stowe-Woodward, Inc.
U. S. Rubber Products, Inc.
Valley Iron Works

COUPLINGS
Allis Chalmers Mfg. Co.
Bagley & Sewall Mfg. Co.
Beloit Iron Works
Black-Clawson Company
De Laval Steam Turbine Co.
Farrel-Birmingham Co., Inc.
The Frederick Iron & Steel
E. D. Jones & Sons Co.
Link Belt Co.
Midwest-Fulton Machine Co.
Moore & White Co.
Shartle Brothers Machine Co.
Stebbins Engrg. & Mfg. Co.
Waldron Corp., John
Walworth Co.
Westinghouse Elec. & Mfg. Co.
T. B. Wood's Sons

CREPING MACHINES
Beloit Iron Works
Hudson Sharp Machine Co.
Paper Converting Machine
Shartle Brothers Machine Co.
John Waldron Corp.

CUTTERS
Beloit Iron Works
Black-Clawson Company
Cameron Machine Co.
Davis, Frank H., Co.
Downingtown Mfg. Co.
Emerson Mfg. Co.
Hamblet Machine Co.
Hudson Sharp Mch. Co.
Shartle Brothers Machine Co.

CYLINDER MACHINES
Beloit Iron Works
Black-Clawson Company
Davis, Frank H., Co.
Downingtown Mfg. Co.
Improved Paper Mchry. Co.
Moore & White Co.
Pusey & Jones Corp.
Shartle Brothers Machine Co.
Valley Iron Works

CYLINDER WIRES
Appleton Wire Works
International Nickel Co.
International Wire Works
Lindsay Wire Weaving Co.

DAMPENERS
Perkins & Son, Inc., B. F.
Valley Iron Works

DAMPER REGULATORS
Cash Company, A. W.
The Foxboro Company

DECKERS
Appleton Machine Co.
Bird Machine Company
Improved Paper Mchy. Corp.
Montague Machine Co.
Moore & White Co.
D. J. Murray Mfg. Co.
Oliver United Filters, Inc.
Shartle Brothers Machine Co.
Valley Iron Works

DECKLE STRAPS
Shartle Brothers Machine Co.
Stowe-Woodward, Inc.
U. S. Rubber Products, Inc.

DEFOAMERS
American Cyanamid & Chemical Corp.
National Oil Products Co.

DESIGNING ENGINEERS
J. E. Sirrine & Company

DIE CUTTERS
Appleton Machine Co., The

DIGESTERS
Pusey & Jones Corp.
Stebbins Engrg. & Mfg. Co.

DIGESTER CONTROLS
The Foxboro Company

DIGESTER FITTINGS
The Cooper Alloy Foundry Co.
Duriron Company
Murray, D. J., Mfg. Co.

DIGESTER LININGS
Stebbins Engrg. & Mfg. Co.

DOCK CONSTRUCTION
Merritt-Chapman & Scott Corp.

DOCTORS
Beloit Iron Works
Bird Machine Company
Black-Clawson Company
Downingtown Mfg. Co.
Lobdell Carwheel Co.
Shartle Brothers Machine Co.
Valley Iron Works

DOCTOR BLADES
John W. Bolton & Sons, Inc.
The Cincinnati Rubber Mfg.
Goodrich Rubber Co., B. F.
Continental Diamond Fibre Co.
Emerson Manufacturing Co.
Improved Paper Mchy. Corp.
International Nickel Co.
The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc.
Stowe-Woodward, Inc.
U. S. Rubber Products, Inc.
Westinghouse Electric & Mfg.

DOCTOR BLADES (Bronze For)
Black-Clawson Company
John W. Bolton & Sons, Inc.
Chase Brass & Copper Co.
Emerson Manufacturing Co.
Shartle Machine Co.

DRAINAGE SYSTEMS
Crane Company
Midwest-Fulton Machine Co.
Stickle Steam Specialties Co.

DREDGING
Merritt-Chapman & Scott Corp.

DRIERS
Allis Chalmers Mfg. Co.
Beloit Iron Works
Black-Clawson Company
Davis, Frank H., Co.
Link Belt Co.
Ross, J. O. Engineering Corp.
Shartle Brothers Machine Co.
Waldron, John, Corp.

DRIVES & DRIVE STANDS
Beloit Iron Works
Bird Machine Co.
Black-Clawson Company
Davis, Frank H., Co.
Downingtown Mfg. Co.
Farrel-Birmingham Co.
General Electric Co.
Link-Belt Co.
Moore & White Co.
Murray, D. J. Mfg. Co.
Pusey Jones Corp.
Shartle Brothers Machine Co.
Valley Iron Works
Westinghouse Electric & Mfg
Worthington Pump & Mchy Corp.

DRYER FELTS
Asten-Hill Mfg. Co.
Mt. Vernon-Woodbury Mills, Inc.
Turner Halsey & Co.
Shuler & Benninghofen

DRYER STEAM CIRCULATION
Midwest-Fulton Machine Co

DRYING SYSTEMS
Midwest-Fulton Machine Co.
Murray Mfg. Co., D. J.
Ross Engineering Corp., J. O
Stickle Steam Specialties
Waldron Corporation, The

DUAL PRESS (Horizontal)
Beloit Iron Works

DUSTERS
Appleton Machine Co.
Downingtown Mfg. Co.
E. D. Jones & Sons Co.
Midwest-Fulton Machine Co.
Moore & White Co
Norwood Eng. Co.
D. J. Murray Mfg. Co.

DYESTUFFS & COLORS
Ciba Company
E. I. du Pont de Nemours & Co.
Geigy Co., The
General Dyestuff Corp.
Heller & Merz
National Aniline & Chemical
N. Y. Color & Chemical Co.
Paper Makers Chemical Co
C. K. Williams & Co.

ELECTRICAL WIRES AND CABLES
U. S. Rubber Products, Inc.

ELECTRIC EQUIPMENT
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Electric & Mfg. Co.

ELEVATORS (Portable)
Link Belt Company
Revolvator Company

EMBOSSING MACHINES
Hudson Sharp Machine Co.
Paper Converting Machine Co.
John Waldron Corp.

EMBOSSING ROLLS
The Appleton Machine Co.
Hudson Sharp Machine Co.
B. F. Perkins & Son, Inc.
Roehlen Engraving Works, Inc.
Waldron Corporation, John

ENGINEERING CONSTRUCTION
Merritt-Chapman & Scott Corp.

EVAPORATORS
Murray, D. J., Mfg. Co.
Swenson Evaporator Co.

EXTRACTORS
Bird Machine Company
Downingtown Manufacturing
E. D. Jones & Sons Co.
Midwest-Fulton Machine Co.
Valley Iron Works Co.

WHERE TO BUY

FANS
Duriron Company
General Electric Co.
B. F. Perkins & Son, Inc.
Ross Engineering Co., J. O.
Westinghouse Electric & Mfg. Co.

FAN CONTROLS (Ventilating)
The Bristol Company
Cash Company, A. W.
The Foxboro Company

FEEDERS
The Jeffrey Manufacturing Co.

FELT CARRIER ROLLS
American Wringer Co.
Appleton Machine Co.
Beloit Iron Works
Black-Clawson Company
The Cincinnati Rubber Mfg. Co.
Downingtown Mfg. Co.
Goodrich Rubber Co., B. F.
Rodney Hunt Machine Co.
Shartle Brothers Machine Co.
Stowe-Woodward, Inc.
U. S. Rubber Products Inc.
Valley Iron Works

FELT CLEANERS
Magnus Chemical Co.
National Oil Products Co.
Philadelphia Quartz Co.

FELT CONDITIONERS
Bird Machine Company

FELTS
Appleton Woolen Mills
Asten-Hill Mfg. Co.
Bulkley Dunton Pulp Co., Inc.
Draper Bros. Co.
Huyck & Son, F. C.
Knox Woolen Co.
Lockport Felt Co.
Mt. Vernon-Woodberry Mills Inc.
Orr Felt & Blanket Co.
Shuler & Benninghofen
Turner Halsey & Co.
Waterbury Felt Co.
H. Waterbury & Sons Co.

FELT GUIDES
Beloit Iron Works
Moore & White Co.
Shartle Brothers Machine Co.
John Waldron Corp.

FELT TIGHTENER (Automatic)
John Waldron Corp.

FERRULES
H. M. Hillman

FF WOOD ROSIN
Southern Naval Stores Co.

FILTERS
Improved Paper Mchy Corp.
Moore & White Co.
Norwood Engrg. Co.
Oliver United Filters Inc.
J. O. Ross Engrg. Corp.
Stebbins Engrg. & Mfg. Co.
Swenson Evaporator Co.

FILTER CLEANERS
Magnus Chemical Co.

FILTER WIRES
Chase Brass & Copper Co.
International Nickel Co.

FITTINGS, Pipe (Plain end or flanged)
Chase Brass & Copper Co.
The Cooper Alloy Foundry Co.
Crane Co.
Duriron Company
Michigan Steel Castings Co.
Walworth Company

FLEXIBLE COUPLINGS
Beloit Iron Works
Black-Clawson Company
De Laval Steam Turbine Co.
Emerson Manufacturing Co.
Farrel Birmingham Co.
The Frederick Iron & Steel Co.
Link-Belt Co.
Midwest-Fulton Machine Co.
Shartle Brothers Machine Co.
John Waldron Corp.
T. B. Wood's Sons
Westinghouse Electric & Mfg. Co.

FLEXIBLE SLICE
E. D. Jones & Sons Co.

FLOORING
American Pressed Steel Co.
Goodrich, B. F. Rubber Co.
Hendrick Mfg. Co.
Norton Co.
Stebbins Engrg. & Mfg. Co.

FLOW METERS
Bristol Co., The
The Foxboro Company
Leeds & Northrup Company

FLY BARS
Black-Clawson Company
Dilts Machine Works, Inc.
Downingtown Mfg. Co.
John W. Bolton & Sons, Inc.
Emerson Manufacturing Co.
Jones & Sons Co., E. D.
Midwest-Fulton Machine Co.
Noble & Wood Machine Co.
Shartle Brothers Machine Co.

FOLDING ENDURANCE TESTERS
Testing Machines, Inc.

FOLDING MACHINES
Emerson Manufacturing Co.
Hamblet Machine Co.
Hudson Sharp Machine Co.
Norwood Eng. Co.
Paper Converting Machine Co., Inc.
Waldron, John, Corp.

FORMING MACHINES
Downingtown Mfg. Co
Shartle Brothers Machine Co.

FOURDRINIER MACHINES
Bagley & Sewall Mfg. Co.
Beloit Iron Works
Black-Clawson Company
Davis, Frank H., Co.
Downingtown Mfg. Co.
Moore & White Co.
Pusey & Jones
Shartle Brothers Machine Co.
Smith & Winchester

FOURDRINIER WIRES
Appleton Wire Works
International Wire Works
Lindsay Wire Weaving Co.
Purves Machine Wire Co.

FREENESS RECORDERS
Trimbley Machine Works

FREENESS TESTERS
Testing Machines, Inc.

FREQUENCY RECORDERS
The Bristol Company
Leeds & Northrup Company

FRICTION TAPE
U. S. Rubber Products Inc.

FURNACE PRESSURE (Draft Control)
The Bristol Company
Cash Company, A. W.
The Foxboro Company
Leeds & Northrup Company

GALVANOMETERS
Foxboro Company
General Electric Co.
Leeds & Northrup Company
Westinghouse Elec. & Mfg. Co.

GAS ANALYSIS EQUIPMENT (SO_2 and CO_2 Recorders)
The Foxboro Company
Leeds & Northrup Company

GAS BURNER CONTROLS Automatic Systems)
Cash Company, A. W.

GATES (Canal)
Rodney Hunt Machine Co.

GATES (Sluice)
Rodney Hunt Machine Co.

GEARS
Beloit Iron Works
Black-Clawson Company
De Laval Steam Turbine Co.
Downingtown Mfg. Co.
Emerson Manufacturing Co.
Farrel-Birmingham Co.
Improved Paper Mchy. Corp.
E. D. Jones & Sons Co.
Link-Belt Co.
Midwest-Fulton Machine Co.
Moore & White Co.
D. J. Murray Mfg. Co.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works
John Waldron Corp.
Worthington Pump & Mchy. Corp.

GEARMOTORS
Midwest-Fulton Machine Co.
Westinghouse Electric & Mfg Co.

GENERATORS
Allis Chalmers Mfg. Co.
De Laval Steam Turbine Co.
General Electric Co
Westinghouse Elec. & Mfg. Co.
Worthington Pump & Mchy. Corp.

GENERAL CONTRACTORS
Merritt-Chapman & Scott Corp.

GRABS & GRAPPLES
J-B Engineering Sales Co.
Link Belt Company

GRANITE ROLLS
Beloit Iron Works
Black-Clawson Company
Downingtown Mfg. Co.
Perkins & Son, Inc., B. F.

GRINDERS
Covel-Hanchett Co.
Eppenbach, Inc.

GRATING (Sidewalk)
Hendrick Mfg. Co
Norton Co.
The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc.

HAMMERS (Soft Faced)
Greene, Tweed & Co.

HAND CLEANERS
Magnus Chemical Co.

HANGERS
Crane Co.
Link Belt Co.
Walworth Co.
T. B. Wood's Sons Co.

HEAT EXCHANGERS
Duriron Company
Midwest-Fulton Machine Co.
Worthington Pump & Mchy. Corp.

HEATING AND VENTILATING SYSTEMS
Babcock & Wilcox Co.
Crane Co.
General Electric Co.
Grinnell Company
D. J. Murray Mfg. Co.
Ross Engineering Corp., J. O.
J. E. Singer
Stickle Steam Specialties Co.
Worthington Pump & Mchy. Corp.
Westinghouse Elec. & Mfg. Co.

HEAT-TREATING FURNACES
Leeds & Northrup Company

HIGH DENSITY THICKENERS
Shartle Brothers Machine Co.

HOISTS
Allis Chalmers Mfg. Co.
Appleton Machine Co.
General Electric Co.
Rodney Hunt Machine Co.
E. D. Jones & Sons Co
Link Belt Co.

HOSE (Air, Water, Suction, etc.)
The Cincinnati Rubber Mfg. Co.
Goodrich Rubber Co.
Goodyear Tire & Rubber Co.
Manhattan Rubber Mfg. Co.
U. S. Rubber Products Inc.

HUMIDITY RECORDERS
The Bristol Company
The Foxboro Company
Leeds & Northrup Company

HYDRAULIC MACHINERY
Farrel-Birmingham Co.

INDICATORS
The Bristol Co.
The Foxboro Company
General Electric Co.
Grinnell Company
Leeds & Northrup Company

INTERFOLDING MACHINES
Hudson Sharp Machine Co.
Paper Converting Machine Co.
John Waldron Corp.

INSTRUMENTS
Bowsher, N. P.
The Bristol Co.
The Foxboro Company
General Electric Co.
Leeds & Northrup Company
Testing Machines, Inc.
Westinghouse Electric & Mfg. Co.

JORDANS
The Appleton Machine Co.
Emerson Manufacturing Co.
E. D. Jones & Sons Co.
Noble & Wood Machine Co.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works

JORDAN FILLINGS
Appleton Machine Co.
John W. Bolton & Sons, Inc.
Davis, Frank H., Co.
Emerson Manufacturing Co.
International Nickel Co.
E. D. Jones & Sons Co.
Noble & Wood Machine Co.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works

K MONEL
International Nickel Co.

KNIVES
Beloit Iron Works
John W. Bolton & Sons, Inc.
Dilts Machine Works, Inc.
Hamblet Machine Co.
E. D. Jones & Sons Co.
Valley Iron Works

LABELLING MACHINES
Potdevin Machine Co.

LABORATORY EQUIPMENT
Appleton Machine Co.
Dilts Machine Works
E. D. Jones & Sons Co.
Leeds & Northrup Company
Mine & Smelter Supply Co.
Noble & Wood Machine Co.
Testing Machines, Inc.
Valley Iron Works
Wilkens-Anderson Co.

LATHES
Montague Machine Co.

LAY BOYS
Hamblet Machine Co.
Moore & White Co.

LEVELERS
National Oil Products Co.

LIFTING PLATFORMS
Revolvator Company

LININGS, Rubber Tank, Pipe Fittings
U. S. Rubber Products Inc.

LIQUID LEVEL RECORDERS
The Foxboro Company
Leeds & Northrup Company

LITHOPONE
Chemical & Pigment Co.
New Jersey Zinc Co.

LOAD (Electrical) Control
Leeds & Northrup Company

LOFT DRYERS
Ross Engineering Corp., J. O.
John Waldron Corp
Valley Iron Works

WHERE TO BUY

LUBRICANTS
Gulf Refining Co.
Standard Oil Co. of Indiana
Tide Water Associated Oil Co.

MACHINERY ERECTION
Merritt-Chapman & Scott Corp.

MAGNIFIERS (Pocket)
Bausch & Lomb Optical Co.

MARKING BANDS (Rubber)
The Cincinnati Rubber Mfg. Co.
Stowe-Woodward, Inc.
U. S. Rubber Products Inc.

MATS, Matting
U. S. Rubber Products Inc.

MEASURING INSTRUMENTS
The Bristol Company
The Foxboro Company
Leeds & Northrup Company
Wilkens-Anderson Co.

METERS
The Bristol Co.
The Foxboro Company
Leeds & Northrup Company
Westinghouse Electric & Mfg. Co.
Worthington Pump & Mchy. Corp.
Worthington-Gamon Meter Co.

METERING & PROPORTIONING SYSTEMS
The Bristol Company
The Foxboro Company
Trimbey Machine Works

MICROMETERS
Farrel-Birmingham Co.
Lobdell Car Wheel Co.
Montague Machine Co.
Testing Machines, Inc.

MICRO-PROJECTORS
Bausch & Lomb Optical Co.

MICROSCOPES
Bausch & Lomb Optical Co.

MIXERS
Eppenbach, Inc.
Link Belt Company
Waldron Corp., John

MONEL METAL (Covered Rolls)
The International Nickel Co.

MONEL METAL (Rolled Forms)
The International Nickel Co.

MOTORS
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Electric & Mfg. Co.

NAPKIN FOLDING MACHINE
Hudson Sharp Machine Co.
Paper Converting Machine Co., Inc.
Waldron, John, Corp.

NICKEL CHROMIUM STEEL
The Cooper Alloy Foundry Co.
Duriron Company

NICKEL-CLAD STEEL
The International Nickel Co.

NICKEL IRON ALLOYS
The Cooper Alloy Foundry Co.
Duriron Company
The International Nickel Co.

OPACIFYING PIGMENT
Chemical & Pigment Co.
New Jersey Zinc Co
Titanium Pigment Co.
R. T. Vanderbilt Co.

OSCILLATORS (Roll Winders)
Midwest-Fulton Machine Co.

PACKAGING MACHINES
Hudson Sharp Machine Co.

PACKING
Cincinnati Rubber Mfg. Co.
Goodrich, B. F. Rubber Co.
Manhattan Rubber Co.
Rhoads, J. E. Sons
Stebbins Engrg. & Mfg. Co.
U. S. Rubber Products Inc.

PACKING BOXES
Shartle Brothers

PACKING (Specially Treated to Caustic Sods and Alkalies)
Greene, Tweed & Co.
U. S. Rubber Products Co.

PACKAGING (Rubber)
B. F. Goodrich Rubber Co.
The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc.

PANZL STRAINERS
Duriron Company

PAPER BAG MACHINERY
H. H. Heinrich, Inc.
Potdevin Machine Co.
Smith & Winchester Mfg. Co.
Shartle Brothers Machine Co.
Strachan & Henshaw, Ltd.
Weber, Herman G.

PAPER CUTTERS
Black-Clawson Company
Davis, Frank H., Co.
Downingtown Mfg. Co.
Hamblet Machine Company
Moore & White Co.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.

PAPER MACHINE APRONS
Goodrich Rubber Co., B. F
U. S. Rubber Products Inc.

PAPER MACHINE DRIER CONTROL SYSTEMS
The Bristol Company
The Foxboro Company
Midwest-Fulton Machine Co.

PAPER MANUFACTURERS
West Virginia Pulp & Paper

PAPER MACHINE HOODS
Ross Engineering Corp., J. O.

PAPER MACHINE SLICES
Beloit Iron Works
Black-Clawson Company
E. D. Jones & Sons Co.
Montague Machine Co.
Valley Iron Works Co.

PAPER MILL ENGINEERS
J. E. Sirrine & Company

PAPER ROLLS
B. F. Perkins & Son, Inc.
Waldron Corp., John

PAPER SCALES
Testing Machines, Inc.

PAPER SIZE
Southern Naval Stores Co.

PAPER TESTERS
Perkins & Son, Inc., B. F.
Valley Iron Work
Testing Machines, Inc.

PAPER TUBE MACHINERY
Dietz Machine Works
Langston Co., Samuel M.

PAPER WAXING MACHINERY
Potdevin Machine Co.
Shartle Brothers Machine Co.
Strachan & Henshaw, Ltd.
Waldron Corp., John

PASTING MACHINES
Beloit Iron Works
Black-Clawson Company
Davis, Frank H., Co.
Murray, D. J., Mfg Co.
Moore & White Co.
Potdevin Machine Co.
Shartle Brothers Machine Co.
John Waldron Corp.

PENSTOCKS
Rodney Hunt Machine Co.

PERFORATING MACHINES
Dietz Machine Works
Waldron John, Corp.

PERFORATED METAL
Chase Brass & Copper Co.
Harrington & King Perforating Co.
Hendrick Mfg. Co.

pH TESTERS AND CONTROL
Leeds & Northrup Company
Wallace & Tiernan, Co., Inc.
Wilkens-Anderson Co.

PHOSPHATE CONTROL EQUIPMENT (Boiler Water)
W. A. Taylor & Co., Inc.

PILLOW BLOCKS
Link Belt Company

PINE OIL (Steam Distilled)
Southern Naval Stores Co.

PIPE
Chase Brass & Copper Co.
The Cooper Alloy Foundry Co.
Duriron Company
Grinnell Company
H. M. Hillman
The International Nickel Co.
T. B. Wood's Sons Co.
Crane Co.
Goodrich, B. B. Rubber Co.
Mundt & Sons, Charles
J. E. Singer
Walworth Co.

PIPE, (Rubber Lined)
U. S. Rubber Products Inc.

PLATES (Filter)
J. E. Singer
Stebbins Engrg. & Mfg. Co.

PIPING CONTRACTORS
Merritt-Chapman & Scott Corp.

PLATES (Floor)
American Pressed Steel Co.

PLATING, CHROMIUM
Chromium Corp. of America

PLATERS
Perkins & Son, Inc., B. F.

PLAYING CARD MACHINERY
Waldron, John, Corp.

PLUGS
Black-Clawson Company
Emerson Manufacturing Co.
E. D. Jones & Sons Co.
Shartle Brothers Machine Co.

POTENTIOMETERS
The Foxboro Company
Leeds & Northrup Company

POWER PLANTS
J. E. Sirrine & Company

POWER TRANSMISSION EQUIPMENT
Allis-Chalmers Mfg. Co.
Beloit Iron Works
Black-Clawson Company
De Laval Steam Turbine Co.
Farrel-Birmingham Co.
Link-Belt Co.
Moore & White Co.
Murray, D. J.
Westinghouse Electric & Mfg. Co.
T. B Wood's Sons
Worthington Pump & Mchy. Corp.

PRECISION INSTRUMENTS
The Bristol Co.
The Foxboro Company
Leeds & Northrup Company
Testing Machines, Inc.

PRESSES
Black-Clawson Company
Farrel-Birmingham Co.
Paper Converting Machine Co., Inc.
Potdevin Machine Co.
Shartle Brothers
Valley Iron Works
Waldron Corp., John

PRESSES (Dual Suction)
Beloit Iron Works

PRESS ROLLS
American Wringer Co., Inc.
Beloit Iron Works
Black-Clawson Company
The Cincinnati Rubber Mfg Co.
Downingtown Mfg. Co.
Goodrich Rubber Co.
The Manhattan Rubber Mfg Division of Raybestos-Manhattan, Inc.
Montague Machine Co.
Perkins & Son, Inc., B F.
Pusey & Jones Corp.
Rodney Hunt Machine Co.
Shartle Brothers
Stowe-Woodward, Inc.
U. S. Rubber Products Inc.
Valley Iron Works

PRESSURE BULKERS
Perkins & Son, Inc., B. F.

PRINTING PRESSES
H. H. Heinrich, Inc.
Hudson Sharp Machine Co.
Potdevin Machine Co.
Paper Converting Machine Co., Inc.
Strachan & Henshaw, Ltd.
John Waldron Corp.
Weber, Herman G.

PULLEYS
Beloit Iron Works
Black-Clawson Company
Downingtown Mfg. Co.
Improved Paper Mchy. Corp.
E. D. Jones & Sons Co.
Link-Belt Co.
Montague Machine Co.
D. J. Murray Mfg. Co.
Shartle Brothers Machine Co.,
Valley Iron Works
T. B. Wood's Sons

PULPSTONES
Norton Co.

PULPS
Andersen Co., J.
Bulkley Dunton Pulp Co., Inc.
Gottesman & Co., Inc.
Lagerloef Trading Co.
Perkins-Goodwin Co.
Price & Pierce, Ltd.
Pulp Sales Corporation
Pulp and Paper Trading Co.
Stora Kopparberg Corp.

PULPERS
Bird Machine Company
Dilts Machine Works, Inc.
Downingtown Mfg. Co.
Improved Paper Mchy. Co.
E. D. Jones & Sons Co.
D. J. Murray Mfg. Co.
Midwest-Fulton Machine Co.
Noble & Wood Machine Co.
Shartle Brothers Machine Co.
Stebbins Engrg. & Mfg. Co

PULP SCREENS
Bird Machine Company
D. J. Murray Mfg. Co.
Trimbey Machine Works

PULP THICKENERS
Bird Machine Company
Downingtown Mfg. Co.
D. J. Murray Mfg. Co.
Moore & White Co.
Shartle Brothers Machine Co.

PULP WASHERS
Oliver United Filters, Inc.

PULP WOOD MACHINERY
Montague Machine Co.

PULPWOOD STACKERS
Link Belt Co.

PUMP PRIMERS (Steam and Water Jet)
Valley Iron Works Co.

PUMP VALVE BALLS (Rubber)
Stowe-Woodward, Inc.

PUMPS
Allis-Chalmers Co.
Beloit Iron Works
Black-Clawson Company

WHERE TO BUY

Davis, Frank H., Co.
Dorr Company
Downingtown Mfg Co.
Duriron Company
Economy Pumping Machinery Co.
Frederick Iron and Steel Co.
De Laval Steam Turbine Co.
Midwest-Fulton Machine Co.
Moore & White Co.
Nash Engineering Co.
Oliver-United Filters, Inc.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works
Warren Steam Pump Co.
Worthington Pump & Mchy. Corp.

PYROMETERS (Roll)
The Bristol Co.
The Foxboro Company
Leeds & Northrup Company

RAG CUTTERS
Perkins & Son, Inc., B. F.
Testing Machines, Inc.

REAM COUNTERS
Hamblet Machine Co.

REBUILT MOTORS
Shartle Brothers Machine Co.

REBUILT PAPER MACHINERY
Davis, Frank H., Co.
Shartle Brothers

RECORDING INSTRUMENTS
The Bristol Co.
The Foxboro Company
General Electric Co.
Leeds & Northrup Company
Trimbey Machine Works
Westinghouse Electric & Mfg. Co.
Wilkens-Anderson Co.

RECOVERY SYSTEMS
The Babcock & Wilcox Co.
Chemical Construction Corp.
D. J. Murray Mfg. Co.
Pusey & Jones
Ross Engineering Corp., J. O.
Stebbins Eng. & Mfg. Co.
Swenson Evaporator Co.
Moore & White Co.
Rodney Hunt Machine Co.
Westinghouse Electric & Mfg. Co.
Worthington Pump & Mchy. Corp.

REELS
Beloit Iron Works
Black-Clawson Company
Downingtown Mfg. Co.
De Laval Steam Turbine Co.
Hudson Sharp Machine Co.
Moore & White Co.
Paper Converting Mch. Co.
Rodney Hunt Machine Co.
Shartle Brothers Machine Co.

REFINERS
Appleton Machine Co.
Bahr Bros.
Emerson Manufacturing Co.
E. D. Jones & Sons Co.
Murray, D. J. Mfg. Co.
Noble & Wood Machine Co.
Shartle Brothers Machine Co.
U.P.M. Kidder Press Co., Inc.
Valley Iron Works

REFRACTORIES
Norton Co.

REGULATORS
The Bristol Co.
Cash Company, A. W.
The Foxboro Company
General Electric Co.
Leeds & Northrup Company
Link Belt Company
Trimbey Machine Works

REPORTS
J. E. Sirrine & Company

REWINDERS
Black-Clawson Company
Paper Converting Mch. Co.
Potdevin Machine Co.

ROD MILLS
Allis-Chalmers Co.
The Mine and Smelter Supply Co.
Murray, D. J. Mfg. Co.

ROLLS (Brass and Copper)
Black-Clawson Company
Chase Brass & Copper Co.
H. M. Hillman
Rodney Hunt Machine Co.
Shartle Brothers Machine Co.

ROLLS (Bronze)
Chase Brass & Copper Co.
Rodney Hunt Machine Co.

ROLLS (Chilled Iron & Gray Iron)
Black-Clawson Company
Davis, Frank H, Co.
Farrel-Birmingham Co.
Improved Paper Mchy. Corp.
Lobdell Car Wheel Co.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works

ROLL COVERS
Continental Diamond Fibre Co.

ROLLS (Rubber or Rubber Covered)
American Wringer Co.
Beloit Iron Works
Black-Clawson Company
The Cincinnati Rubber Mfg. Co.
Davis, Frank H., Co.
B F. Goodrich Rubber Co.
Goodyear Tire & Rubber Co.
D. J. Murray Mfg. Co.
Downingtown Mfg. Co.
Improved Paper Mchy. Corp.
The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc.
Montague Machine Co.
Shartle Brothers Machine Co.
Rodney Hunt Machine Co.
U. S. Rubber Products Inc.
Stowe-Woodward, Inc.

ROLLS (Wooden)
Rodney Hunt Machine Co.

ROLL GRINDERS
Farrel-Birmingham Co.
Lobdell Car Wheel Co.
Montague Machine Co.
Simonds-Worden-White Co.

ROLL SLITTING MACHINES
Cameron Machine Co.
Langston Co., Samuel M.
Potdevin Machine Co.
U.P.M. Kidder Press Co., Inc.

ROLL STANDS
Cameron Machine Co.
Moore & White Co.
Potdevin Machine Co.
Shartle Borthers Machine Co.
U.P.M. Kidder Press Co., Inc.

ROLL WINDING MACHINES
Cameron Machine Co
Potdevin Machine Co.
U.P.M. Kidder Press Co., Inc.

ROOFING
Chase Brass & Copper Co.
J. E. Singer

ROPE DRIVES
Allis-Chalmers Mfg. Co.

RUBBER COVERING
Cincinnati Rubber Mfg. Co.
Manhattan Rubber Mfg. Co.
Stowe-Woodward, Inc.
U. S. Rubber Products Inc.

RUBBER PRINTING PLATE EQUIPMENT
H. H. Heinrich, Inc.

RUBBER VALVES (Ball)
Shartle Brothers
Stowe-Woodward, Inc.
U. S. Rubber Products Inc.

SALT
Pennsylvania Salt Mfg. Co.
Solvay Sales Corp.

SALT CAKE
American Cyanamid & Chemical Corp.
Gottesman Co.
Grasselli Chemical Dept. of Du Pont de Nemours & Co.
Pennsylvania Salt Mfg. Co.

SATURATING MACHINES
Beloit Iron Works
Black-Clawson Company
Moore & White Co.
Potdevin Machine Co.
Shartle Brothers Machine Co.
Waldron, John, Corp.
Weber, Herman G.

SAVEALLS
Bird Machine Company
De Laval Steam Turbine Co.
Dorr Company
Downingtown Mfg. Co.
Improved Paper Mchy. Corp.
Moore & White Co.
Oliver-United Filters, Inc.
Shartle Brothers Machine Co.

SAVE-ALL PANS
Continental Diamond Fibre Co.

SCALES
Testing Machines, Inc.

SCREEN DIAPHRAGMS
The Cincinnati Rubber Mfg. Co.
Goodrich Rubber Co., B. F.
E. D. Jones & Sons Co.
Manhattan Rubber Mfg. Co.
Stowe-Woodward, Inc.
U. S. Rubber Products Inc.

SCORE TESTERS
Testing Machines, Inc.

SCREENS
Appleton Wire Works
Beloit Iron Works
Bird Machine Company
Davis, Frank H., Co.
Dilts Machine Works, Inc.
Downingtown Mfg. Co.
Harrington & King Perforating Co.
Hendrick Manufacturing Co.
Improved Paper Mchy. Corp.
E. D. Jones & Sons Co.
Link-Belt Co.
Montague Machine Co.
Moore & White Co.
Charles Mundt & Sons
D. J. Murray Mfg. Co.
Shartle Brothers Machine Co
Valley Iron Works Co.

SCREEN PLATE
Bird Machine Company
E. D. Jones & Sons Co.
D. J. Murray Mfg. Co.
Hendrick Mfg. Co.
Improved Paper Mchy. Corp.
Shartle Brothers Machine Co.

SHAFTS
E. D. Jones & Sons Co.

SHAFTS (Bronze)
H. M. Hillman

SHAFTS, COLLAPSIBLE WINDOWS
Moore & White Co.

SHAFT COUPLINGS
Midwest-Fulton Machine Co.

SHAFTS (Forged)
Moore & White
T. B. Wood's Sons

SHAKER PANELS
Continental Diamond Fibre Co.

SHEET MACHINE
Noble & Wood Machine Co.
Strachan & Henshaw, Ltd.
Williams Apparatus Co.

SHEET METAL (Brass & Copper)
H. M. Hillman

SHEET METAL WORK
J. E. Singer

SHEAVES
Montague Machine Co .
T. B. Wood's Sons Co.

SHELLS (Jordan)
Emerson Manufacturing Co.
E. D. Jones & Sons Co.

SHOWER PIPES
Bird Machine Company
Downingtown Mfg. Co.
Moore & White Co.
Shartle Bros. Mch. Co.
Smith & Winchester Mfg. Co.

SILENT GEARS
Continental Diamond Fibre Co.

SILICATE OF SODA
American Cyanamid & Chemical Corp.
Diamond Alkali Company, (Standard Silicate Division)
Philadelphia Quartz Co.

SIZING
American Cyanamid & Chemical Co.
Bennett, Inc.
Paper Makers Chemical Corp.
National Oil Products

SIZING PROCESS
American Bewoid Co.
Bulkley-Dunton Pulp Co., Inc.
Bennett, Inc.
J. B. Calva & Co.
Eppenbach, Inc.
National Oil Products Co.
Rose Engrg. Corp., J. O.

SLIME ELIMINATION
Wallace & Tiernan Co., Inc.

SLIME REMOVER
Magnus Chemical Co.
National Oil Products Co.

SLITTERS AND REWINDERS
Bagley & Sewall Mfg. Co.
Beloit Iron Works
Black-Clawson Company
Cameron Machine Co.
Dietz Machine Works
Downingtown Mfg. Co.
Hamblett Machine Co.
Langston Co., Samuel M.
Moore & White Co.
Potdevin Machine Co.
Smith & Winchester Mfg. Co.
Strachan & Henshaw, Ltd.
U.P.M. Kidder Press Co., Inc.
Waldron Corporation, John

SLUICE BARS
Continental Diamond Fibre Co.

SMOKE DENSITY INDICATING RECORDERS
Leeds & Northrup Company

SO_2 RECORDERS
Leeds & Northrup Company

SODA ASH
American Cyanamid & Chemical Corp.
Columbia Alkali Corp.
Diamond Alkali Company
Paper Makers Chemical Corp.
Pennsylvania Salt Mfg. Co.
Solvay Sales Corp.

SOAP POWDER
Magnus Chemical Co.
Paper Makers Chemical Corp.

SODIUM METASILICATE
Philadelphia Quartz Co.

SODIUM SULPHATE
American Cyanamid & Chemical Corp.
Pennsylvania Salt Mfg Co.

SORTING TABLES
Moore & White Co.

SPECIAL MACHINERY
Appleton Machine Co.
Beloit Iron orks
Davis, Frank H., Co.
Downingtown Mfg. Co.
Duriron Company
Eppenbach, Inc.
Farrel-Birmingham Co.
Hamblet Machine Co.
Hudson Sharp Machine Co.
E. D. Jones & Sons Co.
Montague Machine Co.
Midwest-Fulton Machine Co.
D. J. Murray Mfg. Co.
Paper Converting Machine Co., Inc.
Potdevin Machine Co.
Rodney Hunt Machine Co.
Shartle Brothers Machine Co.
Strachan & Henshaw, Ltd.
John Waldron Corp.

SPECIALTY DEVELOPMENT
J. B. Calva & Co.

SPEED INDICATING RECORDERS
The Bristol Company
Leeds & Northrup Company

SPEED REDUCERS
Beloit Iron Works
De Laval Steam Turbine Co
Farrel-Birmingham Co.
Rodney Hunt Machine Co.
Link-Belt Co.
Midwest-Fulton Machine Co.
Westinghouse Elec. & Mfg. Co.
Worthington Pump & Mch. Corp.

SPROCKETS
Improved Paper Mchy. Corp.
Link-Belt Co.

STAIR and FLOOR TILES—(Non-Slip)
Norton Compar

STAIR TREADS
American Pres d Steel Co.
Chase Brass & Copper Co.
Hendrick Mfg. Co.
Norton Company

STARCH
American Cyanamid & Chemical Corp.
Clinton Co.

STEAM FITS & PACKING BOXES
Shartle Brothers

STEAM SPECIALTIES
Cash Company, A. W.
Crane Co.
Stickle Steam Specialties Co.

STEEL
Duriron Company
International Nickel Co.
Timken Roller Bearing Co.

STEEL PLATE CONSTRUCTION
Hendrick Mfg. Co.
Link-Belt Co.
Ross Engrg. Corp., J. O.

STOCK CUTTERS
Perkins & Son, Inc., B. F.

WHERE TO BUY

STOKERS
Babcock & Wilcox Co.
The Frederick Iron & Steel Co.
Link-Belt Co.
Swenson Evaporator Co.
Westinghouse Elec. & Mfg. Co.

STOCK REGULATORS
Trimbey Machine Co.

STRAW MAKING MACHINERY
Samuel H. Langston Co.

STUFF CHESTS
Downingtown Mfg Co.
Hauser Stander Tank Co.
Improved Paper Mchy. Corp.
E. D. Jones & Sons Co.
Midwest-Fulton Machine Co.
Moore & White Co.
D. J. Murray Mfg. Co.
Noble & Wood Machine Co.
Shartle Brothers Machine Co.
Valley Iron Works Co.
G. Woolford Wood Tank Mfg. Co.

STUFF PUMPS
Beloit Iron Works
De Laval Steam Turbine Co.
Downingtown Mfg. Co.
The Frederick Iron & Steel Co.
Moore & White Co.
Noble & Wood Machine Co.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works
Warren Steam Pump Co.

SUCTION BOXES
Black-Clawson Company
Downingtown Mfg. Co.
E. D. Jones & Sons Co.
Shartle Brothers Machine Co.
Trimbey Machine Co.

SUCTION BOX COVERS
Beloit Iron Works
Black-Clawson Company
Continental Diamond Fibre Co.
Emerson Manufacturing Co.
E. D Jones & Sons Co.
Moore & White Co.
Shartle Brothers Machine Co.
Westinghouse Electric & Mfg. Co.

SUCTION ROLLS
American Wringer Co.
Beloit Iron Works
Black-Clawson Company
Downingtown Mfg. Co.
Goodrich Rubber Co., B. F.
Stowe-Woodward, Inc.
U. S. Rubber Products Inc.

SULPHUR
American Cyanamid & Chemical Corp.
Texas Gulf SulphurCo.

SULPHUR BURNERS
Chemical Construction Corp.
Chemi.-Pulp Process
Valley Iron Works

SUPER CALENDERS
Beloit Iron Works
Farrel-Birmingham Co.
Lobdell Car Wheel Co.
Moore & White Co.
Norwood Engrg. Co.
Perkins & Son, Inc., B. F.
Smith & Winchester Mfg. Co.

SURVEYS
J. E. Sirrine & Company

SYPHONS (Flexible)
Midwest-Fulton Machine Co.

TABLE ROLLS
American Wringer Co
Beloit Iron Works
Black-Clawson Company
Goodrich Rubber Co., B. F.
Rodney Hunt Machine Co.
The Cincinnati Rubber Mfg. Co.
Stowe-Woodward, Inc.
U. S. Rubber Products Inc.

TACHOMETERS
The Bristol Co.
The Foxboro Company
Leeds & Northrup Company
Testing Machines, Inc.

TANKS
Babcock & Wilcox Co.
Cincinnati Rubber Mfg. Co.
Continental Diamond Fibre Co.
Hauser Stander Tank Co.
Hendrick Mfg. Co.
The Jeffrey Manufacturing Co.
E. D. Jones & Sons Co.
Kalamazoo Tank & Silo Co.
The Manhattan Rubber Mfg. Co.
J. O. Ross Engrg. Corp.
Stebbins Engrg. & Mfg. Co.
U. S. Rubber Products Inc.
Waldron Corp., John
G. Woolford Wood Tank Mfg. Co.

TEAR TESTERS
Testing Machines, Inc.

TELEMETERS
The Bristol Company
The Foxboro Company
Leeds & Northrup Co.

TELETYPE MACHINES
American Tel. & Tel. Co.

TEMPERATURE RECORDERS
The Bristol Co.
The Foxboro Company
Leeds & Northrup Company

TENSILE TESTERS
Perkins & Son, Inc., B. F.
Testing Machines, Inc.

TESTERS (Bursting Strength)
Perkins & Son, Inc., B. F.
Testing Machines, Inc.

TESTERS (pH)
Leeds & Northrup Company
Wallace & Tiernan Co., Inc.
Wilkens-Anderson Co.

TESTING LABORATORY
J. B. Calva & Co.
E. I. du Pont de Nemours & Co., Inc.

TESTERS (SMOOTHNESS
Testing Machines, Inc.

TESTERS (STIFFNESS)
Testing Machines, Inc.

TESTING INSTRUMENTS
Testing Machines, Inc.

THICKENERS
Bird Machine Company
Dorr Co.
Downingtown Mfg. Co.
Emerson Mfg. Co.
Improved Paper Mchy. Corp.
Moore & White Co.
D. J. Murray Mfg. Co.
Oliver-United Filters, Inc.
Shartle Brothers Machine Co.

TITANIUM PIGMENT
Chemical & Pigment Co.
Titanium Pigment Co.
R. T. Vanderbilt Co.

TIE RODS
International Nickel Co.

TOILET FOLDING MACHINES
Hudson Sharp Machine Co.
Paper Converting Machine Co., Inc.

TOILET WINDERS
Cameron Machine Co.
Dietz Machine Works
Hudson Sharp Machine Co.
Paper Converting Mch. Co.

TOWEL FOLDING MACHINES
Paper Converting Machine Co., Inc.
Waldron Corp., John

TOWEL INTERFOLDING MACHINES
Dietz Machine Works
Hudson Sharp Machine Co.
Paper Converting Mch. Co.

TOWEL WINDER
Cameron Machine Co.
Hudson Sharp Machine Co.
Paper Converting Mch. Co.
Waldron Corp., John

TOWERS
Cameron Machine Co
Hudson Sharp Machine Co.
Stebbins Engrg. & Mfg. Co.
Waldron Corp., John

TRANSMISSION BELT
U. S. Rubber Products Inc.

TRANSMISSION MACHINERY
Appleton Machine Co.
Beloit Iron Works
Black-Clawson Company
De Laval Steam Turbine Co.
Farrel-Birmingham Co.
Link-Belt Co.
Shartle Brothers Machine Co.
Timken Roller Bearing Co.
T. E. Wood's Sons
Worthington Pump & Mchy. Corp.

TRAPS (Steam)
Crane Co
Grinnell Company
Midwest Fulton Mch. Co.
Stickles Steam Specialties Co.

TREADS (Stair)
American Pressed Steel Co.
Norton Company
U. S. Rubber Products Inc.

TRUCKS
Baker-Raulang Co.
Moore & White Co.
Towmotor Company
Revolvator Company

TUBES (Paper)
Elixman Paper Core Co.
Sonoco Products Co.

TUBING
Chase Brass & Copper Co.
H. M. Hillman
The International Nickel Co.
Timken Roller Bearing Co.

TUBS
De Laval Steam Turbine Co.
Rodney Hunt Machine Co.
G. Woolford Wood Tank Mfg. Co.

TURBINES (Water)
Allis-Chalmers Mfg. Co.
De Laval Steam Turbine Co.
Rodney Hunt Machine Co.
Westinghouse Electric & Mfg. Co.
Worthington Pump & Mchy. Corp.

TURBO-GENERATORS
Allis-Chalmers Mfg Co.
Chicago Electric Co.
De Laval Steam Turbine Co.
Westinghouse Electric & Mfg. Co.
Worthington Pump & Mchy. Corp.

USED EQUIPMENT
Consolidated Products Co.
Gibbs-Brower Co.
Shartle Brothers Machine Co.

VALVES
The Bristol Company
Cash Company, A. W.
The Cooper Alloy Foundry Co
Crane Co.
Duriron Company
The Foxboro Company
E. D. Jones & Sons Co.
D. J. Murray Mfg. Co.
Shartle Brothers Machine Co
Trimbey Machine Works
Walworth Co.

VENTILATING SYSTEMS
J. O. Ross Engrg. Corp.

VULCANIZERS
H. H. Heinrich, Inc.

WASHERS
Bird Machine Company
Downingtown Mfg. Co.
Improved Paper Mchy. Corp
E. D. Jones & Sons Co.
Moore & White Co.
Oliver-United Filters, Inc.
Swenson Evaporator Co.

WASHERS (Felt, Endless)
Rodney Hunt Machine Co.

WASHER CYLINDERS
Midwest-Fulton Machine Co.

WASHING ENGINES
Emerson Manufacturing Co.
Midwest-Fulton Machine Co.

WATER ANALYSIS EQUIPMENT
Wilkens-Anderson Co.

WATER SUPPLY & CONTROL
J. E. Sirrine & Company

WATER WHEELS
Rodney Hunt Machine Co.

WAXING MACHINERY
Beloit Iron Works
Black Clawson Co.
Improved Paper Mchy. Co.
Potdevin Machine Co.
Shartle Brothers Machine Co.
Strachan & Henshaw, Ltd.
Waldron, John, Corp
Weber, Herman G.

WAX SIZE
American Cyanamid & Chemical Corp.
Bennett, Inc.
National Oil Products Co.
Paper Makers Chemical Corp.

WELDING
Grinnell Company
Westinghouse Electric & Mfg. Co.

WHEATSTONE BRIDGES
The Brown Instrument Co.
Leeds & Northrup Company

WET MACHINES
Bagley & Sewall Mfg. Co.
Beloit Iron Works
Black Clawson Co.
Downingtown Mfg. Co.
Improved Paper Mchy. Corp.
Moore & White Co.
Montague Machine Co.
Pusey & Jones Corp.
Smith & Winchester Mfg Co.
Valley Iron Works

WINDERS & REWINDERS
Bagley & Sewall Mfg. Co.
Beloit Iron Works
Black-Clawson Company
Cameron Machine Co.
Davis, Frank H., Co.
Dietz Machine Works
Downingtown Mfg. Co.
Langston Co., Samuel M.
Moore & White Co.
Paper Converting Mch. Co.
Potdevin Machine Co.
Pusey & Jones Corp.
Smith & Winchester Mfg. Co.
Strachan & Henshaw, Ltd.
The Textile Finishing Machy. Co.
U.P.M. Kidder Press Co., Inc.
John Waldron Corp.

WIRES
Appleton Wire Works
Chase Brass & Copper Co.
H. M. Hillman
Impoved Paper Mchy. Corp.
International Wire Works
Lindsay Wire Weaving Co.

WIRE CLEANERS
Magnus Chemical Co.

WIRE CLOTH
Chase Brass & Copper Co.
International Nickel Co.
Oliver-United Filters, Inc.

WIRE GUIDES
Moore & White Co.
John Waldron Corp.

WIRE GUIDE ROLLS
American Wringer Co.
Goodrich Rubber Co., B. F.
Stowe-Woodward, Inc.
U. S. Rubber Products Inc.

WIRE STRETCH ROLLS
American Wringer Co.
Stowe-Woodward, Inc.
U. S. Rubber Products Inc.
Valley Iron Works

WOOD PULP IMPORTERS
Stora Kopparberg Corp.

WOOD ROLLS
Rodney Hunt Machine Co.

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D. J. Murray Mfg. Co.
Moore & White Co.

WOOD TANKS
Hauser Stander Tank Co.
G. Woolford Wood Tank Mfg. Co.
Rodney Hunt Machine Co.

WOOD TURPENTINE (Steam Distilled)
Southern Naval Stores Co.

WORMED CUTTERS
American Wringer Co.
The Cincinnati Rubber Mfg. Co.
Stowe-Woodward, Inc.

WRENCHES
Walworth Co.

WRENCHES (Ratchet)
Greene, Tweed & Co.

ZINC DUST
New Jersey Zinc Co.

ZINC OXIDE PIGMENT
New Jersey Zinc Co.

ZINC SULPHIDE PIGMENT
New Jersey Zinc Co.

ALPHABETICAL INDEX TO ADVERTISERS

A

Amer. Cynamid & Chemical Corp..... —
American Pressed Steel Co..... —
American Tel. & Tel. Co..... —
American Wringer Co., Inc..... —
Anderson & Co., J..... —
Appleton Machine Co..... —
Appleton Wire Works, Inc..... 117
Appleton Woolen Mills..... 16
Asten Hill Mfg. Co..... —

B

Babcock & Wilcox Co..... —
Bagley & Sewall Mfg. Co..... 4
Baker-Raulang Co..... —
Bantam Bearings Coorp..... 57
Barnes, Henry K., Co..... 114
Bauer Brothers Company..... —
Bausch & Lomb Optical Co..... —
Beloit Iron Works..... 31
Bennett Incorporated.....Front Cover
Bird Machine Co..... —
Black-Clawson Co..... 8
Bolton, John, & Son, Inc..... —
Bowsher Co., N. P..... —
Bristol Company..... —
Bulkley, Dunton Pulp Co. Inc..... 113

C

Calco Chemical Co., Inc..... —
Cameron Machine Co..... 23
Casein Co. of America, Inc..... —
Cash Company, A. W..... —
Chase Brass & Copper Co..... —
Chemical Construction Corp..... 18
Chemical Lining Engineers, Inc..... —
Chemical & Pigment Co..... 115
Chemipulp Process, Inc..... 114
Chromium Corp. of America..... 17
Ciba Company..... —
Cincinnati Rubber Mfg. Co..... —
Classified Advertising..... —
Clinton Company..... —
Colledge, E. W..... —
Columbia Alkali Corp..... —
Commercial Credit Co..... —
Continental Diamond Fibre Co..... —
Cooper Alloy Foundry Co..... 117
Covel-Hanchett Co..... 21
Crane Co..... 15
Cumberland Steel Co..... 18

D

De Laval Steam Turbine Co..... 61
Diamond Alkali Co..... —
Dietz Machine Works..... —
Dilts Machine Works, Inc..... 117
Dorr Company..... 6
Downingtown Mfg. Co..... 5
Draper Brothers Co..... 107
Du Pont de Nemours & Co..... —
Du Pont de Nemours & Co., Grasselli Chemical Dept..... 13
Duriron Company..... —

E

Eastwood-Neally Corp..... 19
Electro Bleaching Gas Co..... —
Elixman Paper Core Co..... —
Emerson Mfg. Co..... —
English China Clay Sales Corp..... —

F

Farrel-Birmingham Co., Inc..... 53
Ferguson Co., Hardy S..... 114
Flexible Steel Lacing Co..... 109
Foxboro Company..... 68
Frederick Iron & Steel Co..... 114

G

Geigy Company..... —
General Chemical Co..... —
General Dyestuff Corp..... 33
General Electric Co..... 49
Glidden Company..... 115
Goodrich Rubber Co., B. F..... —
Goodyear Tire & Rubber Co..... —
Gottesman & Co..... —
Grasselli Chemical Dept. of Du Pont de Nemours & Co..... 13
Greene Tweed Co..... 3
Grinnell Company..... —
Gulf Refining Co..... 7

H

Hamblet Machine Company..... —
Hardy, George F..... 114
Harrington & King Perforating Co.... 113
Hauser Stander Tank Co..... —
Heinrich, H. H., Inc..... —
Heller & Merz Corp..... —
Hendrick Mfg. Co..... 117
Hillman, H. M..... 115
Hudson-Sharp Machine Co..... —
Hunt, Rodney, Machine Co..... 113
Huyck & Sons, F. C..... —

I

Improved Paper Machinery Co.....42-43
International Nickel Co..... —
International Pulp Co..... 117
International Wire Works..... 117

J

Johnson & Wierk, Inc..... 114
Jones, E. D., & Sons Co..... 117

K

Kalamazoo Tank & Silo Co..... 113
Knox Woolen Co..... 113

L

Lagerloef Trading Company, Inc..... 117
Langston Co., Samuel M..... 114
Leeds & Northrup..... —
Lindsay Wire Weaving Co..... 111
Link Belt Co..... 9
Lobdell Car Wheel Co..... 14
Lockport Felt Co..... 21

M

Magnus Chemical Co..... 14
Manhattan Rubber Co..... 47
Mason-Nielan Regulator Co..... —
Merritt-Chapman & Scott Corp..... 41
Michigan Steel Casting Co..... 117
Midwest Fulton Machine Co..... —
Mine & Smelter Supply Co..... —
Montague Machine Co..... 17
Moore & White Company..... 16
Mt. Vernon-Woodbury Mills, Inc..... —
Mundt & Sons, Charles..... 115
Murray Mfg. Co., D. J..... 107

N

Nash Engineering Co..... 117
National Aniline Chemical Co..... 20
National Oil Products Co..... —
New Jersey Zinc Co..... —
New York Color & Chemical Co..... 59
Noble & Wood Machine Co..... —
Norton Company..... —
Norwood Engineering Co..... —

O

Oakes, Roland T., & Co..... 111
O'Donoghue, Roderick..... —
Oliver-United Filters Co..... —
Orr Felt & Blanket Co..... —

P

Paper Converting Machinery Co..... 109
Paper Makers Chemical Division of Hercules Powder Co..... 45
Paper Makers Importing Co..... 111
Patron, M. & T., Co..... 117
Pennsylvania Salt Mfg. Co..... —
Perkins-Goodwin Co..... —
Perkins & Sons, Inc., B. F..... —
Philadelphia Quartz Co..... 20
Potdevin Machine Co..... 109
Price & Pierce, Ltd..... 107
Pulp Sales Corporation..... 65
Pussey & Jones Corp..... 35

R

Republic Flow Meters Co..... 2
Rhoads Sons, J. E..... —
Roehlen Engraving Works, Inc..... —
Ross Engineering Corp, J. O..... —
Rust Engineering Co..... 114

S

Sabin Robbins Paper Co..... —
Seybold Machine Company..... 24
Shartle Bros. Machine Co..... 8
Shell Union Oil Co..... —
Shuler & Benninghofen..... —
Silco Pulp Products Co..... 11
Singer, Joseph E..... —
Sirrine, J. E., & Co..... 114
Smith & Winchester Mfg. Co..... 51
Solvay Sales Corp..... 109
Sonoco Products Co..... —
Southern Naval Stores..... 117
Spain, H. H., & Co..... —
Standard Oil Co. of Indiana....Back Cover
Stebbins Engrg. & Mfg. Co..... 63
Stickle Steam Specialties Co..... —
Stora Kopparberg Corp..... 29
Stowe-Woodward, Inc..... —
Strachan & Henshaw, Ltd..... —

T

Testing Machines, Inc..... 107
Texas Gulf Sulphur Co..... 55
Thompson Mfg. Co..... 114
Tide Water Assoc. Oil Co..... 117
Timken Roller Bearing Co..... —
Titanium Pigment Co., Inc..... 10
Towmotor Company..... —
Trimbey Machine Works..... —

U

Union Talc Company..... —
U. S. Rubber Products, Inc..... —
U. P. M. Kidder Press Co..... —

V

Valley Iron Works..... 125
Vanderbilt Co., R. T..... —

W

Waldron Corp., John..... 18
Wallace & Tiernan Co., Inc..... 22
Walworth Company..... —
Warren Steam Pump Co..... —
Waterbury Felt Co..... —
Waterbury, H., & Sons Co..... 117
Weber, H. G., & Company..... 117
Weiner Refiner Engrg. Co..... —
Westinghouse Elec. & Mfg. Co..... —
West Virginia Pulp & Paper Co..... 115
Weyerhaeuser Timber Co..... 12
Whiting Corporation..... —
Wilkens Anderson Co..... —
William & Co., C. K..... 111
Wood Sons Co., T. B..... 19
Worthington Pump & Mchy. Corp..... —
Wyckoff & Sons, A..... 113

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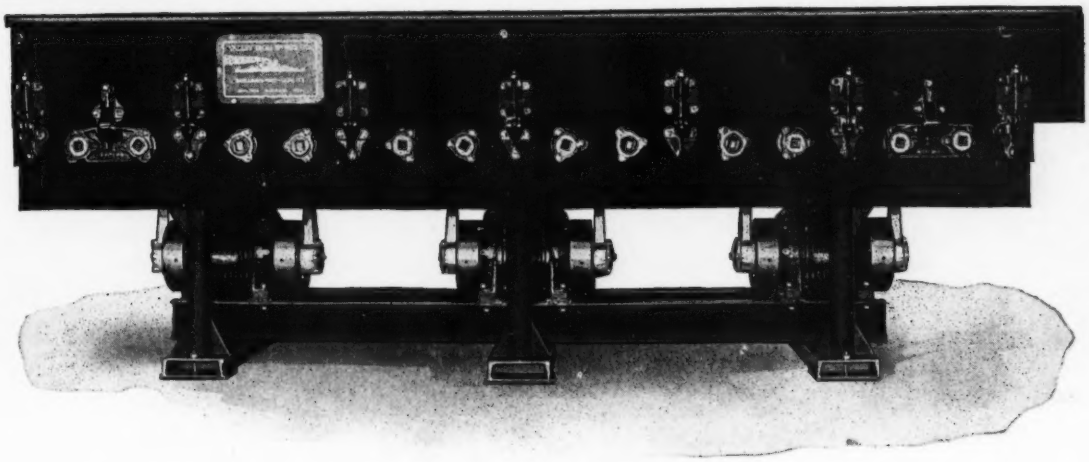

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